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Warehouse #
763-9098

ecology and environment, inc.

108 SOUTH WASHINGTON, SUITE 302, SEATTLE, WASHINGTON 98104, TEL. 206-624-9537

International Specialists in the Environmental Sciences

547-0701

Tony Hess
509-535-8794
924-1569

Mr. Leitrich
(John)
547-4802

Lou Cohen
206 442-2712

PROPOSED SAMPLING PLAN
RESOURCE RECOVERY CORPORATION
PASCO, WASHINGTON

TDD R10-8410-14

Report Prepared By: Ecology and Environment, Inc.

Project Manager: Andrew Hafferty

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Submitted To: J.E. Osborn, Regional Project Officer
Field Operations and Technical Support Branch
U.S. Environmental Protection Agency
Region X

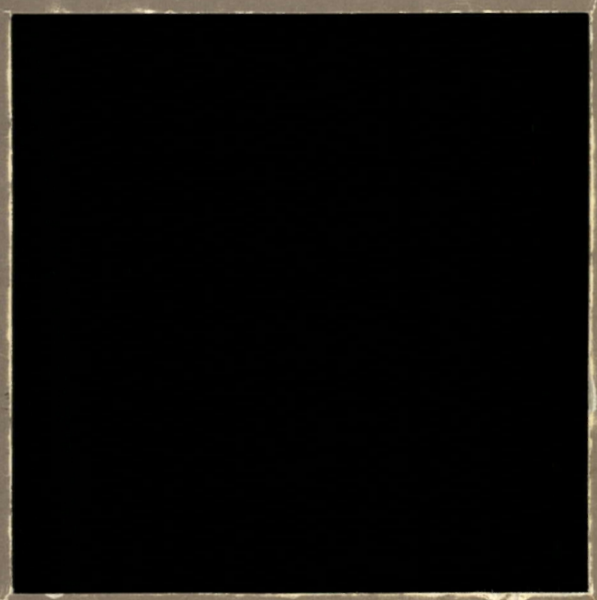
E-1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

HAZARDOUS
SITE CONTROL
DIVISION

Remedial Planning / Field Investigation Team (REM/FIT)

ZONE II



CONTRACT NO.
68-01-6692

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1.0 INTRODUCTION/OBJECTIVES

The United States Environmental Protection Agency (EPA) under Technical Directive Document (TDD) R10-8410-14, has tasked Ecology and Environment's Seattle Field Investigation Team (E&E, FIT) to plan and conduct a field investigation at Resource Recovery Corporation's former disposal site in Pasco, Washington. This document describes the scope of work and the tasks required to fulfill this study.

Documentation indicates that the Resource Recovery disposal site received substantial quantities of industrial wastes, including:

- o acid sludges
- o metal finishing wastes
- o oils
- o paint manufacturing wastes
- o wood treatment/preservative materials
- o plywood resins
- o pesticide production wastes
- o other waste materials

The objective of this field investigation is to determine if these materials have migrated from disposal zones and if further investigation of the site is necessary.

The scope of work includes:

Preliminary Studies: Review existing waste disposal, analytical, and hydrogeologic data on the site and design an appropriate sampling plan.

Field Studies: Resurvey and mark burial zone perimeters, resurvey all existing monitoring wells, measure groundwater elevations and verify flow direction, monitoring well drilling and installation, surface and subsurface soil sampling, groundwater sampling, and sample analysis.

Final Report: Description of actual field work, analytical results, conclusions, and recommendations.

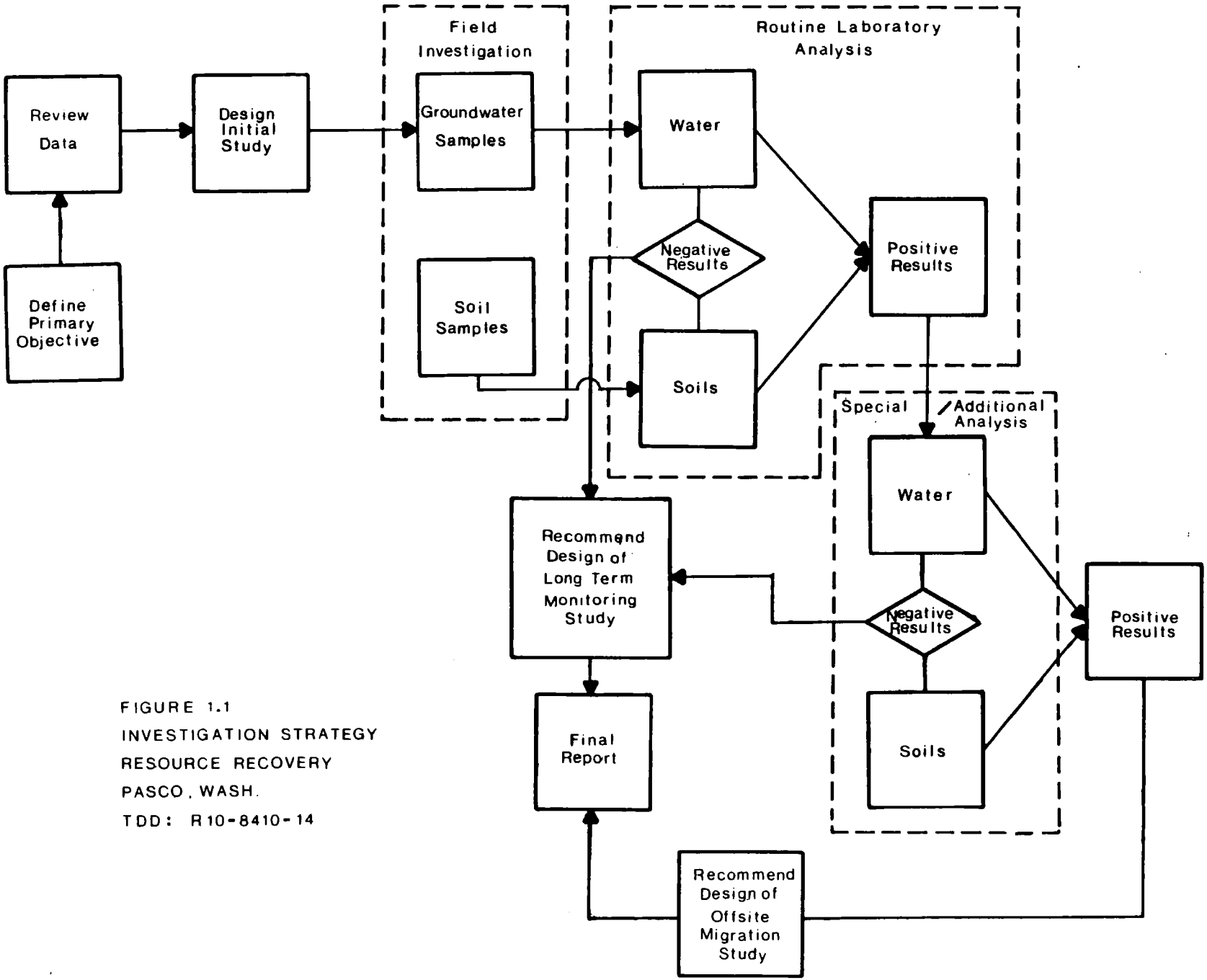


FIGURE 1.1
INVESTIGATION STRATEGY
RESOURCE RECOVERY
PASCO, WASH.
TDD: R10-8410-14

PRELIMINARY STUDIES

2.0 SITE HISTORY AND DESCRIPTION

2.1 Site Location

Resource Recovery Corporation's hazardous waste burial sites are all within the boundaries of the Pasco Sanitary Landfill which is located approximately 1.5 miles northeast of the City of Pasco, Washington. The landfill is in the southwest quarter of Section 15 and the northwest quarter of Section 22, Township 09 north, Range 30 east, Willamette Meridian, Franklin County, Washington (Figures 2.1 and 2.2). The nearest cross streets are Kahlotus Road and Highway 12; Pasco, Washington. The latitude is 46°15'07"N and the longitude is 119°03'13" W.

2.2 Site History

Pasco Sanitary Landfill originally known as the Basin Disposal Company dump site was owned and operated by John Dietrich and had been the site of what was primarily a municipal waste open burning dump from 1956 until 1971. In 1971 all burning was halted and the site was converted to a sanitary landfill. In 1974, Pasco Sanitary Landfill began and is currently accepting large quantities of septic wastes for open pit disposal. In 1981, Larry Dietrich took over as owner and operator of Pasco Sanitary Landfill (2.1). The site is currently operated as a landfill.

Resource Recovery Corporation (RRC) formed by a partnership between Basin Disposal Company and Chemical Processors, Inc., of Seattle, (Larry Dietrich, Waste Site Operator/Manager) leased a portion of the Pasco Sanitary Landfill (PSL) in 1972 and began operations as a regional hazardous waste site under Washington Department of Ecology Permit No. 5301 issued March 21, 1973 (2.2). The site accepted potentially hazardous wastes between early 1972 and December 1974 (Table 2.1).

2.3 Waste Management Practices

According to recent interviews and past records (2.4,2.5), Resource Recovery Coporation, at least to some degree, segregated wastes at the disposal site (Table 2.1 and Figure 2.3). A portion of the site, hereafter referred to as Zone A, had been used for disposal of paint wastes prior to the Resource Recovery takeover. Resource Recovery records stated that drums were stacked on end, usually three levels high after their operations began.

The space between drums was backfilled with common debris, empty pesticide drums, and small unidentified lots of waste. The pit is reported to contain drums of: paint wastes, pesticide residues, wood

R. 30 E.

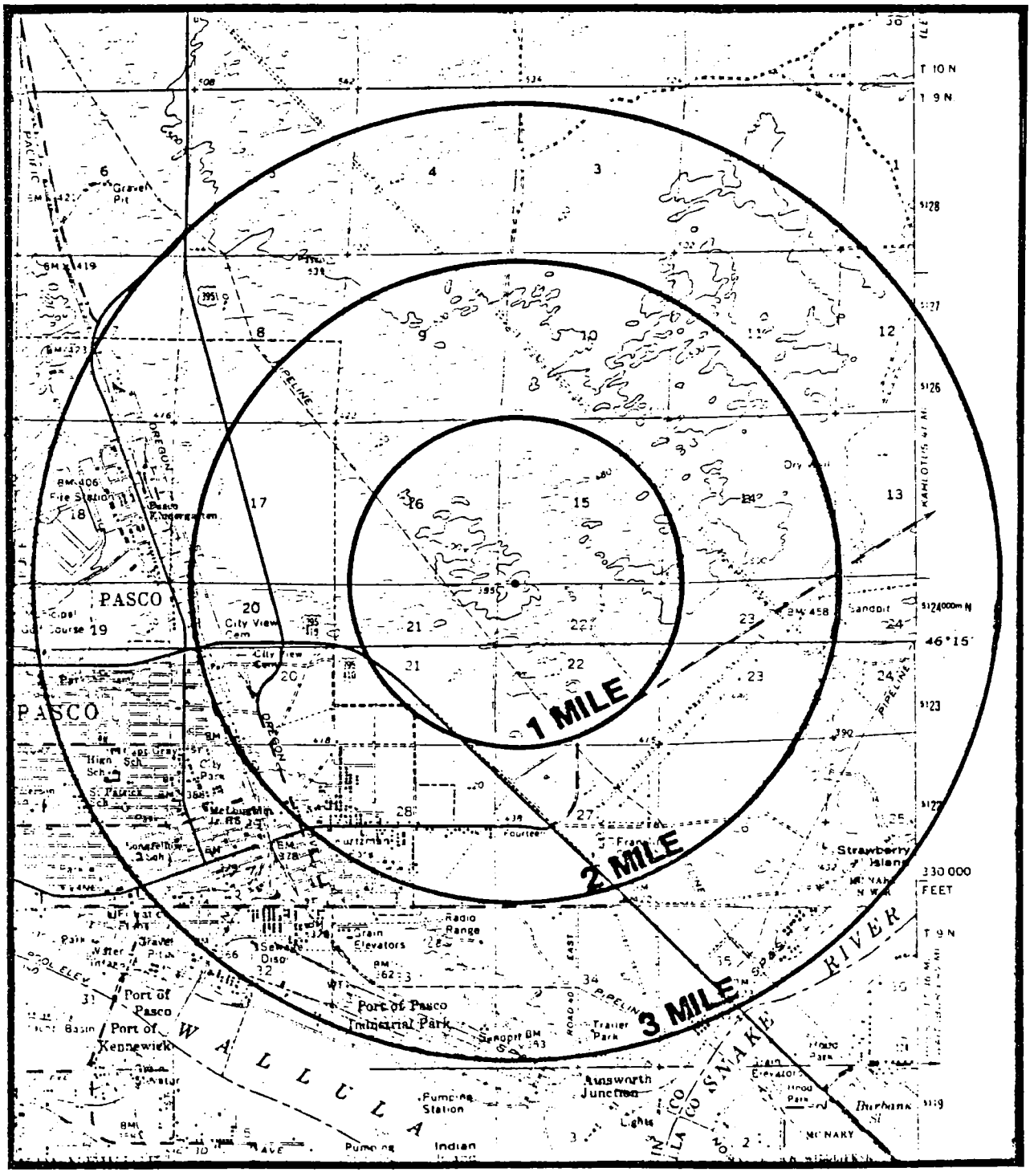


FIGURE 2.1
Resource Recovery
Vicinity Map

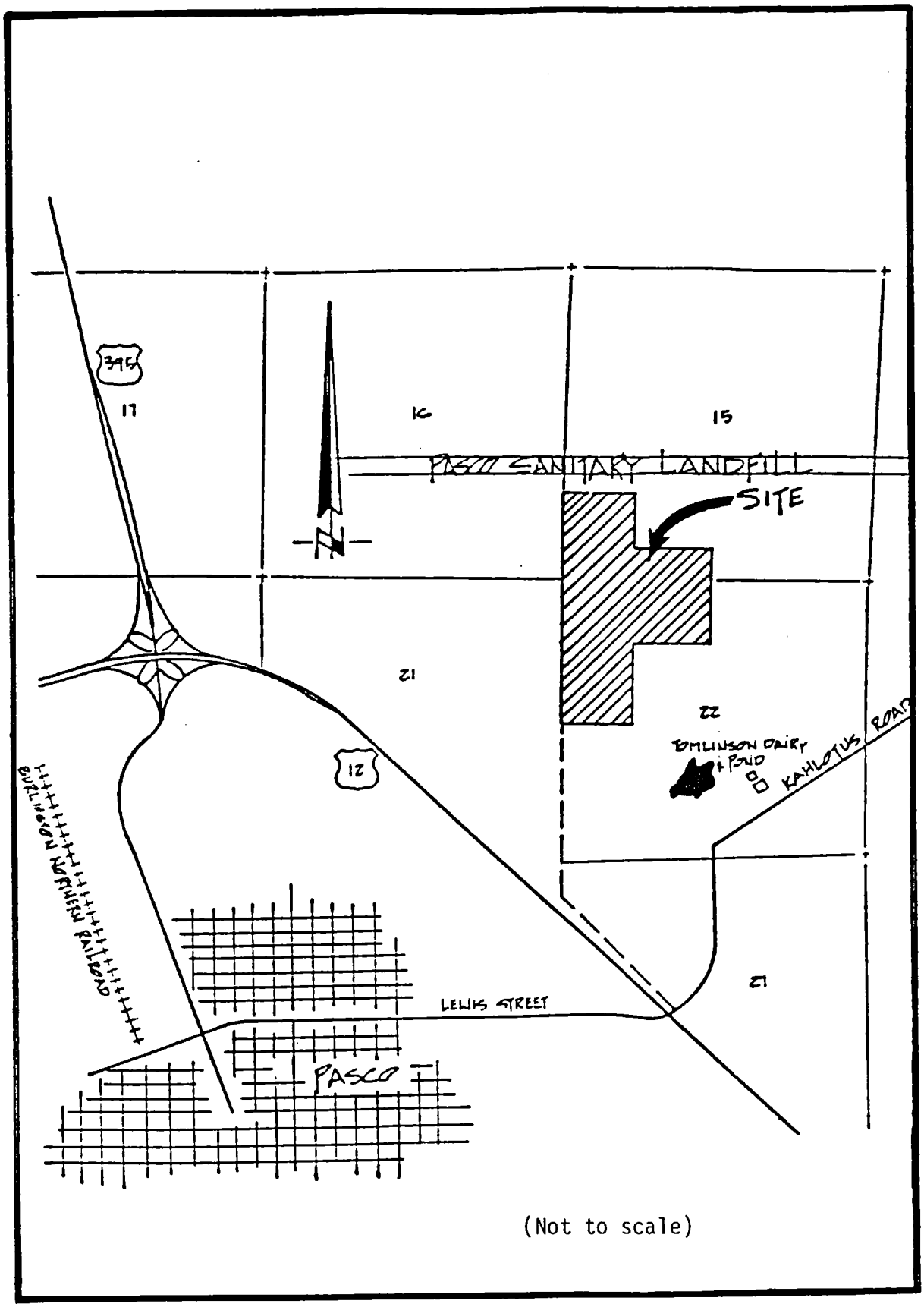


FIGURE 2.2
Resource Recovery

Site Map

TABLE 2.1
WASTE QUANTITIES DISPOSED OF
AT PSL BY RRC(2.1)

Location	Description (Size*/Lining)	Waste Type	Estimated Quantity	Units
Site A	100'x100' bottom unlined top lined	acids	544	drums
		aromatic tars	160-248	drums
		carcinogenics (unspecified)	9	drums
		caustics	8,774	drums
		cadmium	11	drums
		metal finishing	244-304	drums
		oil sludge	433	drums
		paint	10,258-24,200	drums
		pesticides	425	drums
		pesticide containers (empty)	791-863	drums
Site B	50'x50' bottom unlined top lined	2,4-D manufacturing	2,011-5,080	drums
Site C	75'x75' bottom unlined top lined	acids	7,000	gallons
		acid metal cleaning	2,301,560	pounds
		lime phenol	684,967	gallons
		metal cleaning	185,162	gallons
		metal finishing	17,000-35,724	gallons
		metal finishing	1,460,602-1,949,652	pounds
Site D	75'x75' bottom unlined top lined	aromatic tar	499,270	pounds
		cutting oil	76,350-84,300	gallons
		fertilizer manufacturing	228,288	pounds
		oily sludge	6,000-66,340	gallons
		paint	72,475-497,418	pounds
		paint	66,516-95,711	gallons
		plywood resin	1,393,380-2,215,440	pounds
		solvents	12,648	gallons
Site E	unknown bottom and top lined	barium with mercury	10,500-11,582	tons
Unknown		acid sludges	1,000	gallons
		acid wash solution	312,350	pounds
		benzoic acid and tar	176,000	pounds
		chemistry lab reagents	1	drum
		chrome rinse water	700,901	pounds
		DCP tar	8,790	gallons
		etching solution	1,914	barrels
		lime sludge	80-160	drums
		MCPA bleed	104,318-327,000	gallons
		MCPA tar	2,965-3,037	drums
			939	drums
			2,813	barrels
			680	pails
		metal casing wastes	3,300-5,760	drums
		misc. lab chemicals	29	sm. containers
		NH_4+ and NaOH chemical solutions	17,238	gallons
		oily sludge	166,680	pounds
		other miscellaneous	435	drums
		pesticide containers	1,045	each
		resin manufacturing	392,553	gallons
		solid caustic soda	44,550	pounds
		wood treatment/preservative	294,662	gallons
			238	drums

treatment wastes, used etching solutions, metal castings wastes, and laboratory chemicals. No free liquids were discharged into this pit. Maximum burial depth of Zone A is reportedly less than 30 feet below the present day surface. The west side of Zone A was utilized for open burning of municipal waste, which was intermittently compacted. The burned area extends approximately 75 feet to the west of the zone. A burial area reserved for large disposal items such as cement walls from building demolition and empty fuel oil tanks extends for 100 yards from the east side of Zone A.

Zone B is the burial site of over 5000 pesticide waste drums from Rhodia (Rhone-Poulenc) Chemical Company, Portland, Oregon. The majority of drums contained 2,4-D Bleed, 2,4-DCP Tar and MCPA waste. Drums were reportedly stacked at least three tiers high in this pit. However, newspaper photographs show drums stacked four high. Zone B was initially created by digging into the south side of a small plateau. While the earth covered top surface of this zone is on the same level as the land to the north, ground level south of the zone is at the same level as the base of the stacked drums.

Records provide conflicting information regarding the area covered by the adjoining Zones C and D. Certain records indicate three pits existed in this area. According to personal communication with Mr. L. Dietrich, only two liquid waste ponds were used. Zone C was an unlined pond used for evaporation of water from lime sludge, ammonia water, metal cleaning acids, and chrome plating wastes. Zone D is listed as an unlined pond used to hold liquid paint, oil, solvent, plywood resin, aromatic tar, pesticide and fertilizer wastes.

Zone E was a lined chlor-alkali evaporative sludge pond that received approximately 12,000 tons of mercury contaminated magnesia and barium sulfate liquors. The aqueous component of these wastes was removed by evaporation. No other kinds of wastes or waste materials were added to this pond.

Unsubstantiated reports state that unsealed and leaking drums were received for disposal by Resource Recovery in shipments from Rhodia. However, Mr. L. Dietrich has stated that the Rhodia drums were all new and in excellent condition.

On closure of the site, all zones were coverd with three feet of soil, four mil polyethylene sheeting, and capped with two additional feet of soil (2.6).

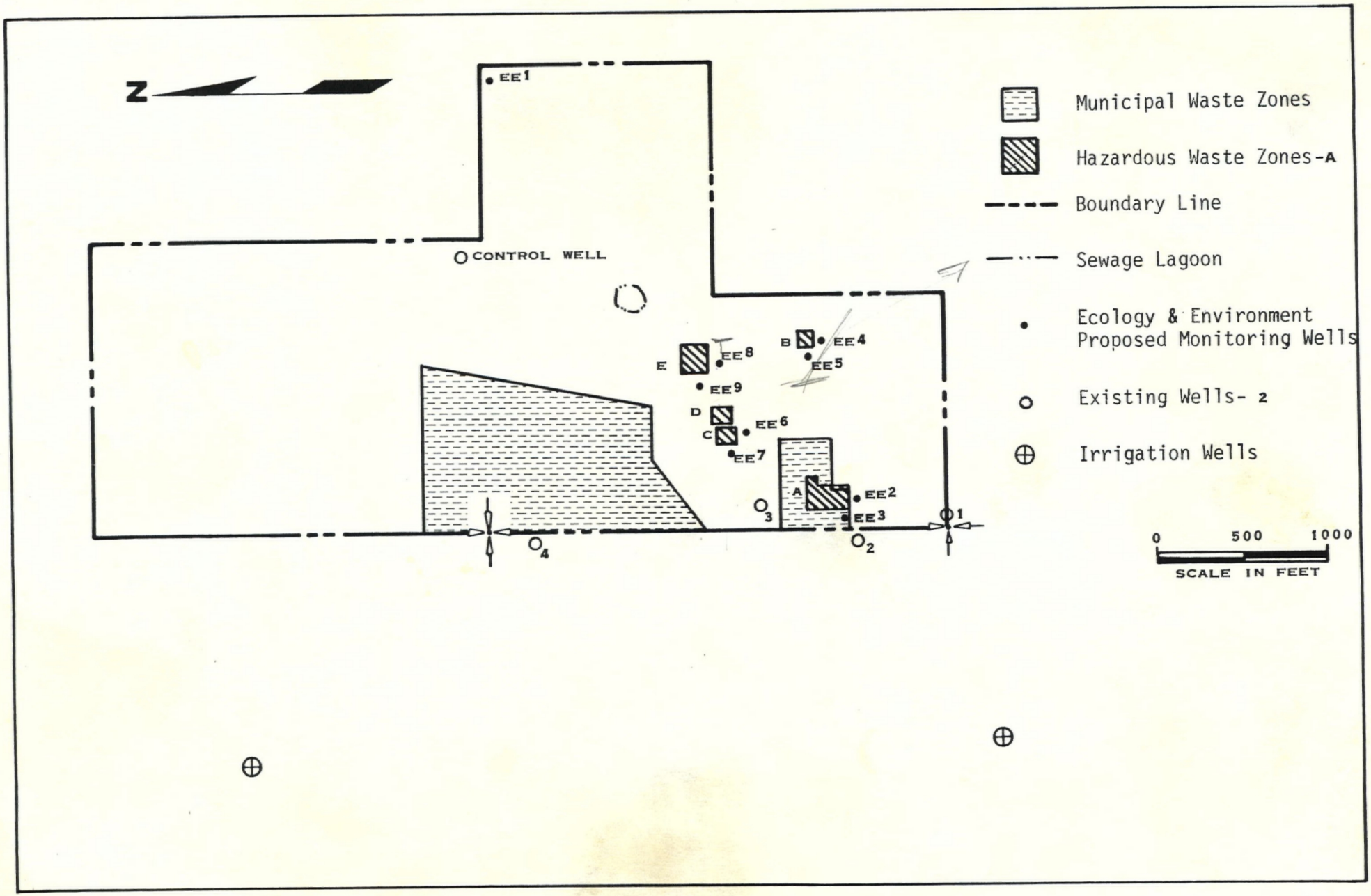


FIGURE 2.3
PASCO SANITARY LANDFILL
HAZARDOUS WASTE BURIAL ZONES AND
EXISTING MONITORING WELL LOCATIONS,
NEW MONITORING WELL LOCATIONS

3.0 ENVIRONMENTAL CHARACTERISTICS

3.1 Physical Setting

Resource Recovery's hazardous waste disposal site is located in a sparsely populated rural area. Approximately 35 people live within a one mile radius of the site. Pasco Sanitary Landfill covers 250 acres. The surface areas of the five burial zones show in Figure 2.3 are listed below (3.1).

	Area
Zone A	36,510 ft^2 (0.84 acres)
Zone B	6,962 ft^2 (0.16 acres)
Zone C	11,758 ft^2 (0.27 acres)
Zone D	10,674 ft^2 (0.25 acres)
Zone E	32,050 ft^2 (0.74 acres)

The landfill is surrounded by irrigated agricultural fields and range land. Eighteen wells pump water for irrigation within a one mile radius. Figure 3.1 provides an aerial overview of the site.

3.2 Meteorology

The Cascade Mountains west of the Kennewick-Pasco-Richland (Tri-cities) area obstruct the easterly flow of ocean-moistened air. The Rocky Mountains and the ranges in southern British Columbia effectively block severe winter storms which move southward across Canada. The result is that the Tri-cities area has a very dry climate with mild winters and hot summers (3.2).

The mean annual precipitation is 6.73 inches with an annual range of 4.05 to 12.90 inches. The maximum precipitation in a 24 hour period is 1.91 inches, recorded in 1957.

The Tri-cities area has a mean annual snowfall of 14.0 inches, which falls mostly in the month of January. Snowfall in measureable amounts can be expected from November to March.

Evaporation potential is approximately 60 inches per year with 80% of all evaporation occurring from May through October. Temperature extremes range from winter lows of -27°F to summer highs of 115°F. The normal westerly air patterns produce mean winter low temperatures of 22°F and mean summer high temperatures of 92°F. There are 56 days per year with a maximum temperature greater than 90°F and 117 days per year with a minimum temperature less than 32°F.

Subsurface soil temperatures have been measured and are shown in Figure 3.2. The mean winter relative humidity ranges from 58- 80% as compared to the summer mean relative humidity of 31-59% .

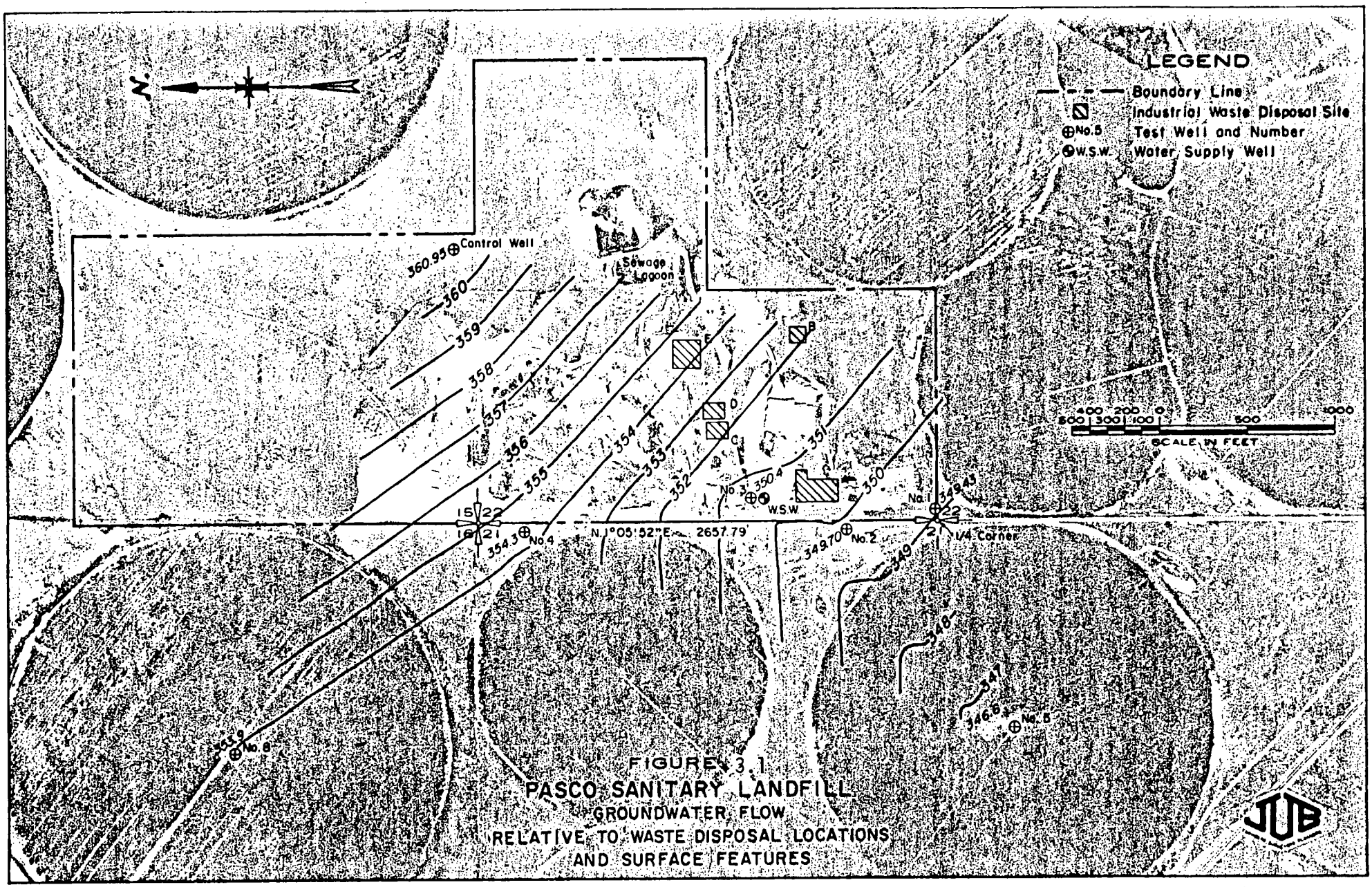


FIGURE 3.1
PASCO SANITARY LANDFILL
GROUNDWATER FLOW
RELATIVE TO WASTE DISPOSAL LOCATIONS
AND SURFACE FEATURES

The wind direction is predominately from the WNW in the summer months with a mean windspeed range of 7.5-9.0 mph; and from the NW in the winter months with a mean windspeed range of 6.0-7.0 mph. Gusts from the SW and SSW of over 70 mph have been recorded, with little variance between summer and winter maximum wind speeds.

3.3 Regional Geology

Well logs and past geological studies have provided information on the shallow geology of the area (2.5, 3.3, 3.4, 3.5). A generalized description of the geologic units anticipated in the Resource Recovery disposal area is presented in Table 3.1. No known zones of low permeability exist which could restrict the vertical migration of pollutants and prevent groundwater contamination.

TABLE 3.1
DESCRIPTION OF GEOLOGIC UNITS

Geologic Unit Sub-Unit	Depth (feet)	Description	Permeability (cm/sec)
Eolian Sand and Silt	surface	Light brown. Very fine sands and silts.	10^{-3}-10^{-5}
Touchet Formation	0-40	Light to medium brown. Very fine to medium grained sands. Occasionally slightly to very silty.	10^{-3}-10^{-5}
Pasco Gravels	40-60	Dark grey. Locally fine to coarse grained sands with occasional gravel.	$>10^{-3}$
Ringold Formation			
Ringold Sands	60-100	Dark grey. Medium to coarse grain with gravel. Gravel increasing and getting coarser with depth.	$>10^{-3}$
Ringold Gravels	100-110	Tan gravel with sand.	$>10^{-3}$
Ringold Clays	>110-140	Blue clay.	
Yakima Basalt	>140	Basalt	10^{-2}-10^{-5}

The surficial soils (approximately 0 to 5 feet in depth) of the Pasco Sanitary Landfill fall into three major categories: Sagehill very fine sandy loam, Kennewick silt loam, and Quincy loamy fine sand.

The Sagehill and Kennewick soils are known to have slow to moderate permeabilities and high water capacity. The risk of both water and wind erosion of this soil is moderate.

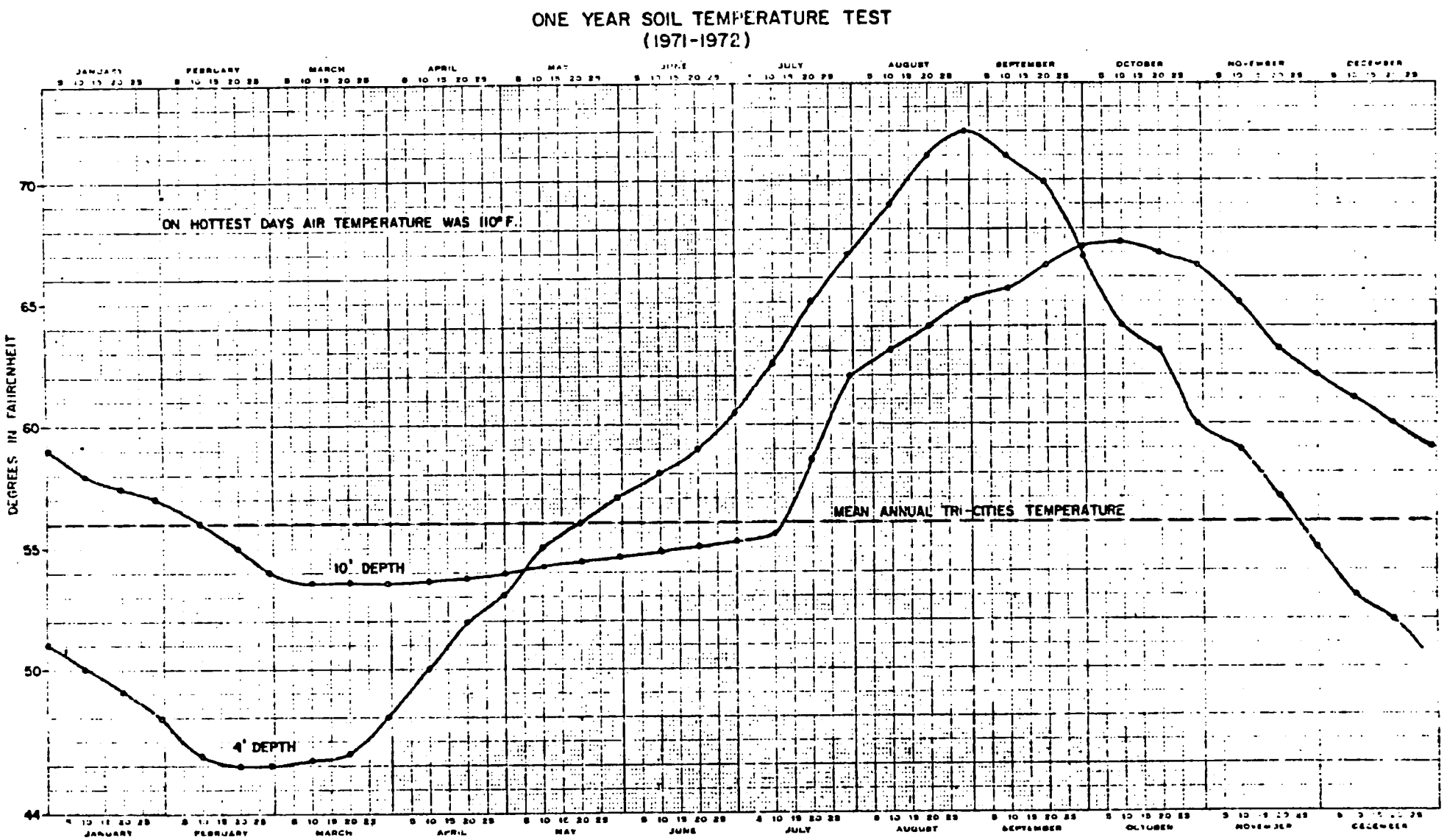

ONE YEAR SOIL TEMPERATURE TEST
(1971-1972)
ON HOTTEST DAYS AIR TEMPERATURE WAS 110° F.
MEAN ANNUAL TRI-CITIES TEMPERATURE
10' DEPTH
4' DEPTH
DEGREES IN FAHRENHEIT
70
65
60
55
50
44
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER

FIGURE 3.2

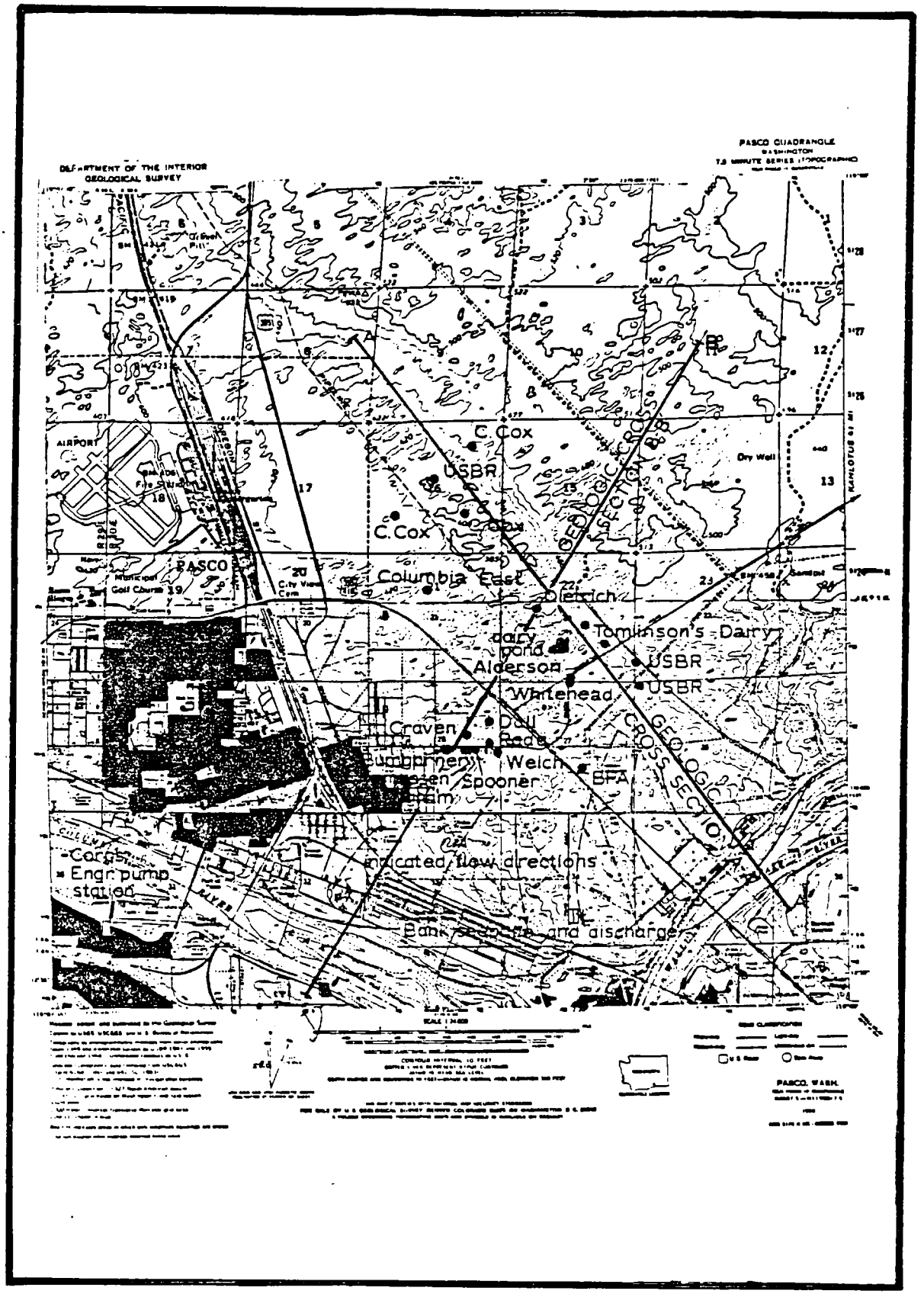
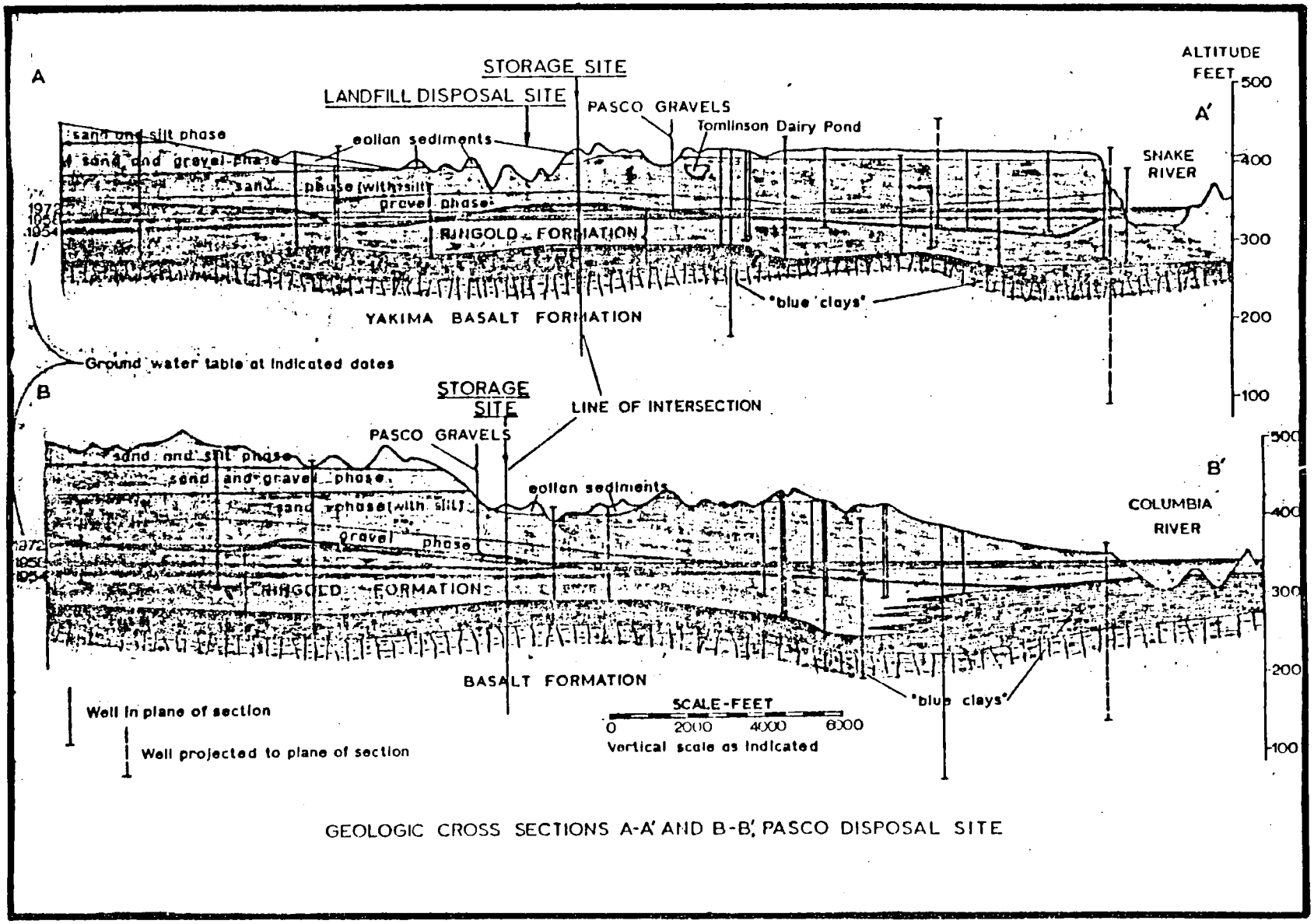


FIGURE 3.3

Resource Recovery Site
Geologic Cross Section Transect Locations



GEOLOGIC CROSS SECTIONS A-A' AND B-B', PASCO DISPOSAL SITE

FIGURE 3.4
Resource Recovery Site
Geologic Cross Section

The Quincy soil type has high water permeability and low water capacity. This soil type has only a slight risk of water erosion. However, the risk of wind erosion is severe.

No data describing the measured organic carbon concentration of these surface and subsurface soils is available, however, in general these types of soils have low organic carbon content.

3.4 Hydrogeology

Groundwater flow was estimated in a 1981 study by JUB Engineers, 2810 W. Clearwater Ave., Kennewick, WA (3.6). Estimates of various groundwater characteristics and parameters were made on samples from 9 wells ranging from 1000 to 5600 feet from the center of the landfill (Figure 3.5). The wells were sampled on 2 consecutive days, April 24 and 25, 1981.

The groundwater flow was found to be in a southwesterly direction. The slope of the gradient across the site is 3.7 feet per 1000 feet.

Subsequent testing of wells installed by JUB Engineers specifically for monitoring the Pasco Sanitary Landfill confirm that this flow pattern was unchanged through a period of first quarterly, and then annual sampling episodes, as illustrated in Figure 3.1 on page 3-2. Well casings were constructed of two-inch PVC pipe with screw joints below the water table and glued joints above. Bentonite seals were placed just above the water table, 20 feet below grade, and at the surface. Two screens were set in each well. Figure 3.6 illustrates JUB well construction detail.

The depth to groundwater below land surface of the wells constructed by JUB is shown in Table 3.2. Data collected from these wells was used to make the estimates of permeability presented in Table 3.1.

TABLE 3.2
GROUNDWATER LEVELS

Well Number	Depth below surface (feet)	Surface Elevation (AMSL)*	Groundwater elevation (AMSL)
1	64	413.9	349.8
2	56	406.2	350.1
3	68	419.1	350.8
4	37	392.75	355.4
Control Well	48	410.1	361.7
Water Supply Well	69	419.1	350.1

*AMSL - Above Mean Sea Level

A groundwater mound may exist 1500 feet to the SE of the site emerging through the ground surface to form the Tomlinson Dairy pond. The existing wells do not provide sufficient information to positively identify or estimate the effect of this groundwater mound on the direction of the flow south of the site.

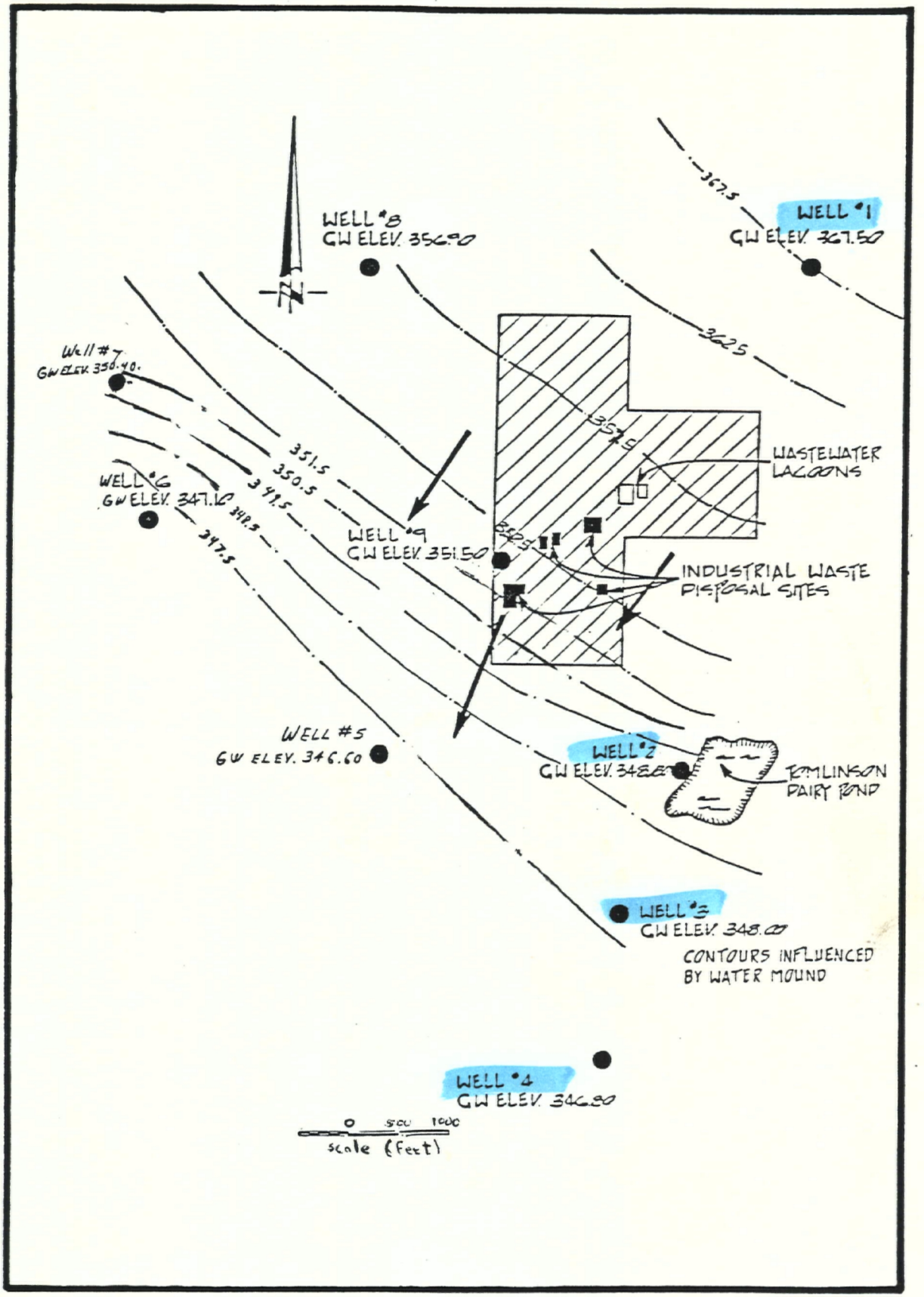


FIGURE 3.5
Hazardous Waste Burial Zones And
Groundwater Elevations and Directional
Flow in the Vicinity of
Pasco Sanitary Landfill

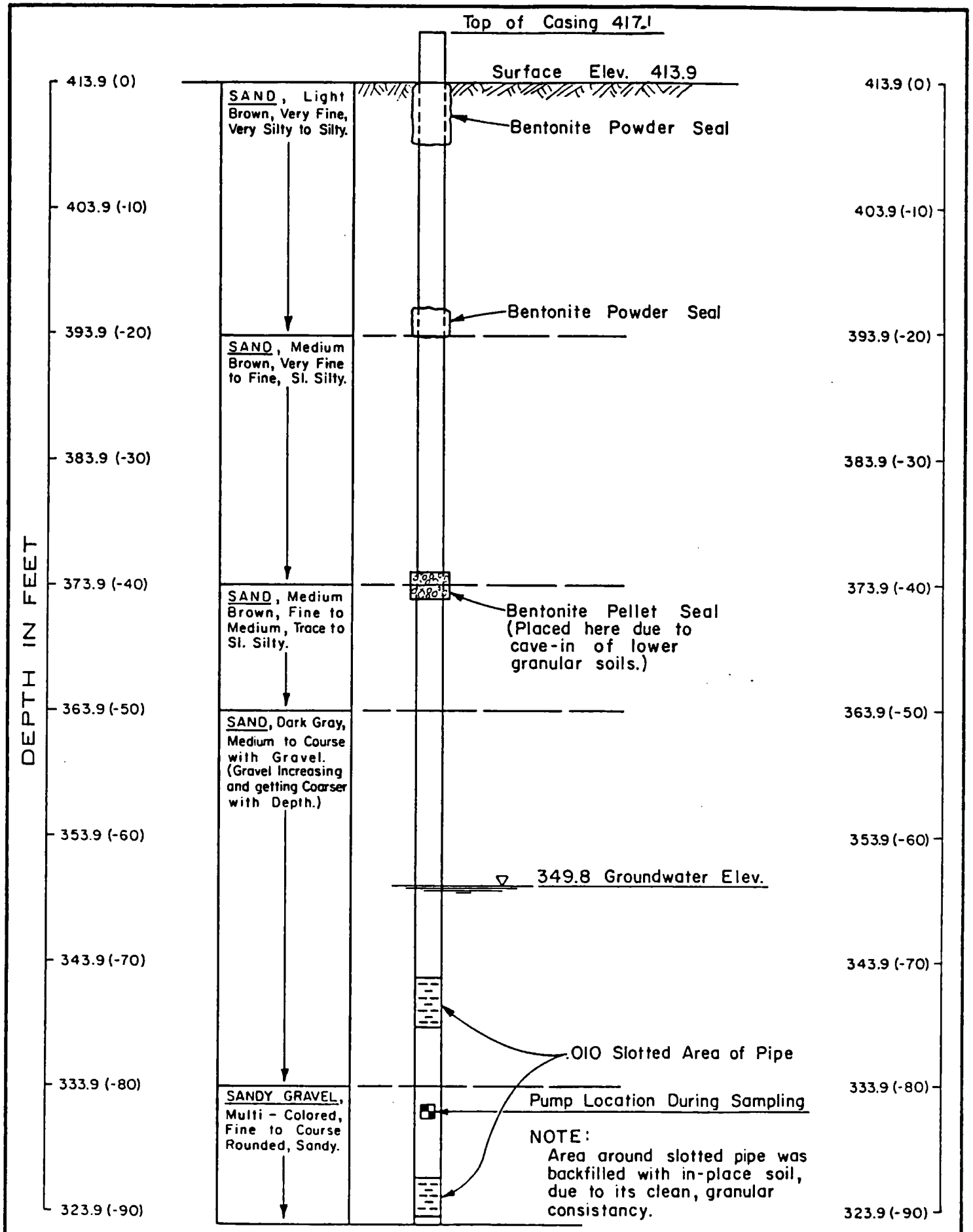


FIGURE 3.6
WELL NO. 1
INSTALLED 1-15-82

Water level drawdowns from the original driller's logs for Wells 5, 6, and 7 (Figure 3.6), traditionally used to estimate the potential yield of a water well, were used to approximate the transmissivity. The transmissivity and permeability data presented in Table 3.3 are based upon pumping data from wells in the most productive depths of the aquifer and may not accurately represent those values for the sandy strata at the top of the aquifer. The transmissivity, permeability and velocity of water flow should be less in the sandy strata than in the gravely depths where these data were collected (3.6).

TABLE 3.3
TRANSMISSIVITY AND PERMEABILITY OF THE UNCONFINED AQUIFER BELOW THE PASCO SANITARY LANDFILL

Well No.	Transmissivity ($ft^3/ft/day$)	Permeability ($ft^3/ft^2/day$)
5	58,600	935
6	27,000	482
7	82,000	1,708

There are 15 Water and Power Resource Service monitoring wells within a four mile radius of the site, however, none are downgradient of the site.

Currently, 18 operational irrigation circles exist within a one mile radius of the Pasco landfill which rely on groundwater pumpage for water supply. Irrigation has had and will continue to have a significant impact on the hydrology in this area. The elevation of the water table has changed markedly since the early 1950s. Between 1950 and 1974/1975 the water table in this area rose approximately 10 feet. The water table has dropped about five feet since 1975. Projected irrigation demands have been incorporated into models, the results of which predict a continuing drop in groundwater elevation through the year 2000 (3.6).

3.5 Surface Water

There is no surface water on or adjacent to the Pasco Sanitary Landfill. The topography of the site could lead to some localized drainage patterns, but the high permeability and climatic conditions probably sustain vertical drainage patterns.

A dairy pond located approximately 2000 feet south-southeast of the disposal area and the Snake and Columbia Rivers, each approximately 15,000 feet southeast and southwest, respectively, of the disposal zones are the surface water bodies closest to the site.

3.6 Receptors

The majority of wastes believed to be hazardous were buried as described in Section 2.4. No spills or accidents involving these wastes have been reported. The top layer of soil capping the burial zones has been eroded by winds, exposing the plastic cover in some places. Resistivity tests have never been conducted in the soils at the site, nor have the drums been examined since burial. As a result, no data exists regarding the present condition of the buried drums.

No past exposures of any kind to buried wastes have been documented. There is no evidence of present exposure, nor is there evidence that any future exposure and risk is imminent.

Air, water and soil samples taken at and near the site in February and June of 1975 were analyzed for 2,4-D and 2,4,5-T by the Department of Ecology. Neither herbicide was detected at the part per million level (3.7). No samples have been analyzed for these compounds since that time.

4.0 PROPOSED FIELD INVESTIGATION

The field investigation of the Resource Recovery Disposal Site is designed to determine whether or not hazardous materials are migrating from the primary burial zones. To accomplish this objective three phases of field work will be performed:

- o Ground water monitoring well installation
- o Soil sample collection and analysis
- o Ground water sample collection and analysis

Prior to commencement the field operations, the direction of groundwater flow will be verified. Each of the five existing wells will be resurveyed to determine its elevation. The depth to groundwater will be measured and contours of groundwater drawn. The perimeter of each burial zone will also be surveyed and staked during this work to provide guidance for monitoring locations.

4.1 Groundwater Monitoring Well Installation

A total of nine groundwater monitoring wells will be installed at the locations depicted in Figure 2.3. Two wells will be installed approximately 30 feet from the downgradient perimeter of each of zones A, B, CD, and E to identify the presence of contaminants outside of the primary disposal areas. Well EE-3 will be set outside the burned and compacted area on the west side of Zone A approximately 100 feet from the burial zone. One well will be installed approximately 1,000 feet east of the existing control well (Figure 2.3) to provide background soil and water quality data for comparison.

Each boring will be advanced with a four-inch inside diameter (I.D.) hollow stem auger to an anticipated maximum depth of 90 feet. Wells will be constructed of two-inch diameter schedule 10 stainless steel casing having a minimum wall thickness of 0.109 inch. A twenty-foot length of wire wound stainless-steel well screen with a slot size appropriate to the formation (0.020 or 0.010 inch slot size) will be installed with the casing. After the screen and casing are in place, a gravel pack of coarse sand will be poured around and two feet above the screen. A fine grained sand cap, a minimum of one-foot in thickness, will be emplaced on top of the gravel pack. A bentonite slurry will then be pumped into the annulus as the augers are withdrawn to provide a uniform seal. The bentonite will be brought to within ten feet below ground level. Cement will be used to grout between that depth and the surface. The well will be protected with six-inch O.D. steel pipe, with a locking cover, set at least three feet into the cement. Figure 4.1 presents a schematic diagram of the well construction details.

Upon completion, each well will be developed by pumping and surging or any other method that will ensure its utility as a monitoring well. Development will continue until the water produced is clear

and free of sand. The drilling and completion of each monitoring well will be overseen by a geologist/hydrologist responsible for the collection of lithologic samples, description of lithology according to Unified Soil Classification System (USGS), selection of perforated intervals for casing screens, and determination of final well depth.

All drill cuttings and development water will be contained in 55-gallon DOT approved drums for subsequent analysis and disposal. All drums will be stored in a secure area on-site with the owners' permission. Disposal of the drum contents will be arranged following analysis of the soil samples. ask Jack Sowa about the waters from background well.

Upon completion of the drilling program, well head elevation of each new and existing well will be surveyed within a vertical accuracy of 0.01 feet. Static water level measurements will be taken in each well on different dates during the investigation to determine groundwater gradients.

4.2 Soil Sample Collection and Analysis

The chemical nature of the wastes buried in the primary disposal zones of Resource Recovery (Table 2.1) suggest that adsorption of certain contaminants by the soil matrix may be significant. Consequently, soil samples will be collected as each monitoring well is constructed.

A discrete sample is defined as the soil collected directly from the hollow stem auger flights on a continual basis for each ten feet of vertical drilling. A complete set of discrete samples will be collected from each borehole. Zone B well heads will be below the upper level of buried drums due to local topography. Therefore, the only discrete samples for analyses will be from 10-20 feet below grade in Zone B and from the background well. Subsurface samples will be composited from 20 feet to groundwater level. All other samples will be composited for each well over the depth ranges of 10-30 feet (approximate burial depths) and 30 feet to groundwater level. Table 4.1 summarizes the depths of the soil sampling intervals for each of the nine monitoring wells.

Samples will be removed from the auger flights with a clean stainless steel spoon at an approximate rate of four ounces per foot of drilling. Each aliquot of soil will be placed into a clean stainless steel bucket and homogenized into a single sample from each ten feet of borehole drilling. An aliquot of each homogenized discrete sample will be archived for future reference and/or analysis. Equal volumes of soil from individual soil samples designated for composite analysis will be mixed in clean stainless steel buckets. Designated discrete samples and composites will be transferred to appropriate containers and submitted to the contract lab for analysis.

Analyses will consist of routine organic and inorganic priority pollutants; 2,4-D; 2,4,5-T; Silvex, and MCPA. In the event that potential dioxin precursors are detected, additional analyses for PCDD and PCDF may be required. Tables 4.2 and 4.3 summarize the analytical soil sampling strategy proposed for this investigation.

4.3 Groundwater Sample Collection and Analysis

Groundwater samples will be collected to determine whether or not contaminants are migrating away from the primary disposal zones in the ground water. Samples will be collected from each of the nine new monitoring wells and from five existing monitoring wells installed by J-U-B Engineers (Figure 2.3).

Prior to collection of each sample, each well will be purged of three to five times the volume of water originally standing in the well. Purging will be accomplished with a two-inch O.D. stainless steel pump. Samples will be collected by utilizing a two-inch O.D. stainless steel bailer.

How about the pump?

35 gallons

All purged water will be collected in 55-gallon DOT approved drums and stored in a secured area on-site pending receipt of the analytical results. Each sample will be transported from the bailer to appropriate containers and submitted to the assigned contract laboratory for analysis. The analytical parameters are described in Tables 4.2 and 4.3. Sample fractions intended for inorganic analysis will be preserved in accordance with standard CLP procedures. Table 4.1 summarizes the proposed ground water sampling strategy for this investigation.

4.4 Decontamination

The following procedures will be used to insure the integrity of samples which may come into contact with the drilling or sampling equipment.

- o Decontaminate bailers, augers, and all sample contact equipment prior to the start of work at each sampling point using the procedure below:

  - wash the equipment using a steam cleaner
  - rinse with tap water
  - rinse with deionized water
  - rinse with nanograde acetone
  - rinse with nanograde methanol
  - air dry in a protected area – sure!!

- Washwater and rinsate will be collected in large (30-gallon) heavy walled galvanized garbage cans or 55-gallon drums and allowed to evaporate on-site.

- Residual cleaning material will be drummed for disposal on-site.

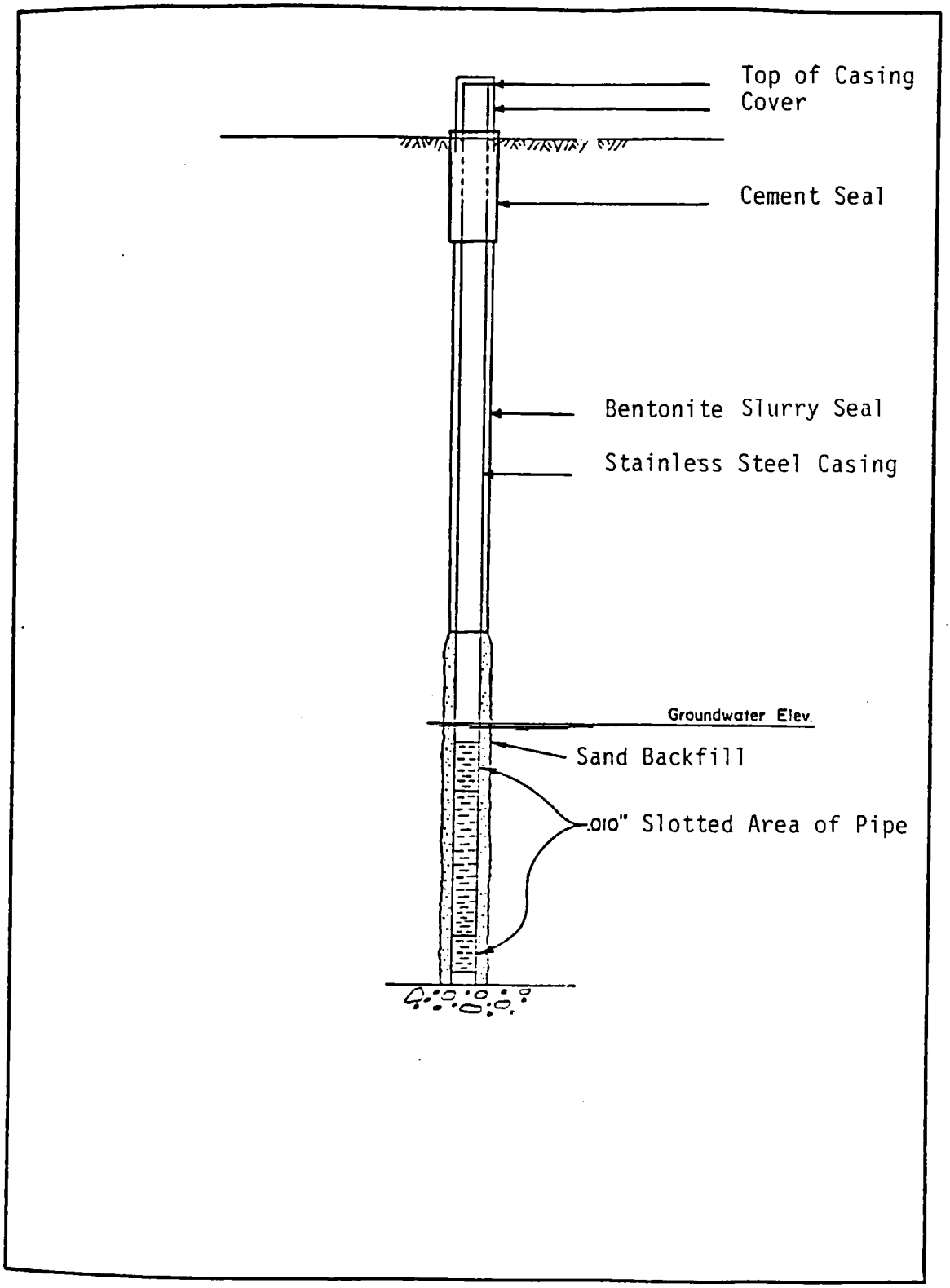


FIGURE 4.1
Schematic Well Diagram

TABLE 4.1
SOIL AND WATER SAMPLE SUMMARY

Location	Well Number	Matrix	Type	Depth (below grade)
Background	EE-1	Soil	Continual Discrete	10-20'
	EE-1	Soil	Continual Composite	10-30'
	EE-1	Soil	Continual Composite	30-Groundwater
Zone A	EE-2	Soil	Continual Composite	10-30'
	EE-2	Soil	Continual Composite	30-Groundwater
	EE-3	Soil	Continual Composite	10-30'
	EE-3	Soil	Continual Composite	30-Groundwater
Zone B	EE-4	Soil	Continual Discrete	10-20'
	EE-4	Soil	Continual Composite	20-Groundwater
	EE-5	Soil	Continual Discrete	10-20'
	EE-5	Soil	Continual Composite	20-Groundwater
Zone CD	EE-6	Soil	Continual Composite	10-30'
	EE-6	Soil	Continual Composite	30-Groundwater
	EE-7	Soil	Continual Composite	10-30'
	EE-7	Soil	Continual Composite	30-Groundwater
Zone E	EE-8	Soil	Continual Composite	10-30'
	EE-8	Soil	Continual Composite	30-Groundwater
	EE-9	Soil	Continual Composite	10-30'
	EE-9	Soil	Continual Composite	30-Groundwater
Background	EE-1	Groundwater	Grab	
Zone A	EE-2	Groundwater	Grab	
	EE-3	Groundwater	Grab	
Zone B	EE-4	Groundwater	Grab	
	EE-5	Groundwater	Grab	
Zone CD	EE-6	Groundwater	Grab	
	EE-7	Groundwater	Grab	
Zone E	EE-8	Groundwater	Grab	
	EE-9	Groundwater	Grab	
see Figure 2.3	JUB No.1	Groundwater	Grab	
see Figure 2.3	JUB No.2	Groundwater	Grab	
see Figure 2.3	JUB No.3	Groundwater	Grab	
see Figure 2.3	JUB No.4	Groundwater	Grab	
see Figure 2.3	JUB Control Well	Groundwater	Grab	

TABLE 4.2

ANALYTICAL SUMMARY

Soils: 19 samples

Analyses	Detection Limits
Inorganics	see Table 4.4
HSL Organics	see Table 4.5
2,4-D	0.2 ug/kg
MCPA	0.2 ug/kg
2,4,5-T	0.2 ug/kg
Silvex	0.2 ug/kg

Waters: 14 samples

Analyses	Detection Limits
Inorganics	see Table 4.4
HSL Organics	see Table 4.5
2,4-D	0.05 ug/l
MCPA	0.05 ug/l
2,4,5-T	0.05 ug/l
Silvex	0.05 ug/l

TABLE 4.3

QUALITY ASSURANCE SUMMARY

Soils:

Duplicates - 2

Auger rinsate blank - 1

Waters:

Duplicates - 2

Bailer rinsate blank - 1

Carbon free water blank - 1

TABLE 4.4

INORGANICS

CONTRACT REQUIRED DETECTION LIMITS

Element	Required Detection Limits (CRDL)-ug/l
Metals:	
1. Aluminum	200
2. Antimony	60
3. Arsenic	10
4. Barium	200
5. Beryllium	5
6. Cadmium	5
7. Calcium	5000
8. Chromium	10
9. Cobalt	50
10. Copper	25
11. Iron	100
12. Lead	5
13. Magnesium	5000
14. Manganese	15
15. Mercury	0.2
16. Nickel	40
17. Potassium	5000
18. Selenium	5
19. Silver	10
20. Sodium	5000
21. Thallium	10
22. Tin	40
23. Vanadium	50
24. Zinc	20
Other:	
Cyanide	10

TABLE 4.5
ORGANICS
Hazardous Substance List (HSL) and
Contract Required Detection Limits (CRDL) **

	Volatiles	CAS Number	Detection Limits Low Water [a] ug/L	Low Soil/Sediment [b] ug/Kg
1.	Chloromethane	74-87-3	10	10
2.	Bromomethane	74-83-9	10	10
3.	Vinyl Chloride	75-01-4	10	10
4.	Chloroethane	75-00-3	10	10
5.	Methylene Chloride	75-09-2	5	5
6.	Acetone	67-64-1	10	10
7.	Carbon Disulfide	75-15-0	5	5
8.	1,1-Dichloroethene	75-35-4	5	5
9.	1,1-Dichloroethane	75-35-3	5	5
10.	trans-1,2-Dichloroethene	156-60-5	5	5
11.	Chloroform	67-66-3	5	5
12.	1,2-Dichloroethane	107-06-2	5	5
13.	2-Butanone	78-93-3	10	10
14.	1,1,1-Trichloroethane	71-55-6	5	5
15.	Carbon Tetrachloride	56-23-5	5	5
16.	Vinyl Acetate	108-05-4	10	10
17.	Bromodichloromethane	75-27-4	5	5
18.	1,1,2,2-Tetrachloroethane	79-34-5	5	5
19.	1,2-Dichloropropane	78-87-5	5	5
20.	trans-1,3-Dichloropropene	10061-02-6	5	5
21.	Trichloroethene	79-01-6	5	5
22.	Dibromochloromethane	124-48-1	5	5
23.	1,1,2-Trichloroethane	79-00-5	5	5
24.	Benzene	71-43-2	5	5
25.	cis-1,3-Dichloropropene	10061-01-5	5	5
26.	2-Chloroethyl Vinyl Ether	110-75-8	10	10
27.	Bromoform	75-25-2	5	5
28.	2-Hexanone	591-78-6	10	10
29.	4-Methyl-2-pentanone	108-10-1	10	10
30.	Tetrachloroethene	127-18-4	5	5
31.	Toluene	108-88-3	5	5
32.	Chlorobenzene	108-90-7	5	5
33.	Ethyl Benzene	100-41-4	5	5
34.	Styrene	100-42-5	5	5
35.	Total Xylenes		5	5

[a] Medium Water Contract Required Detection Limits (CRDL) for Volatile HSL Compounds are 100 times the individual Low Water CRDL.

[b] Medium Soil/Sediment Contract Required Detection Lmits (CRDL) for Volatile HSL Compounds are 100 times the individual Low Soil/Sediment CRDL.

	Semi-Volatiles	CAS Number	Detection Limits Low Water [c] ug/L	Low Soil/Sediment [d] ug/Kg
36.	N-Nitrosodimethylamine	62-75-9	10	330
37.	Phenol	108-95-2	10	330
38.	Aniline	62-53-3	10	330
39.	bis(2-Chloroethyl) ether	111-44-4	10	330
40.	2-Chlorophenol	95-57-8	10	330
41.	1,3-Dichlorobenzene	541-73-1	10	330
42.	1,4-Dichlorobenzene	106-46-7	10	330
43.	Benzyl Alcohol	100-51-6	10	330
44.	1,2-Dichlorobenzene	95-50-1	10	330
45.	2-Methylphenol	95-48-7	10	330
46.	bis(2-Chloroisopropyl) ether	39638-32-9	10	330
47.	4-Methylphenol	106-44-5	10	330
48.	N-Nitroso-Dipropylamine	621-64-7	10	330
49.	Hexachloroethane	67-72-1	10	330
50.	Nitrobenzene	98-95-3	10	330
51.	Isophorone	78-59-1	10	330
52.	2-Nitrophenol	88-75-5	10	330
53.	2,4-Dimethylphenol	105-67-9	10	330
54.	Benzoic Acid	65-85-0	50	1600
55.	bis(2-Chloroethoxy) methane	111-91-1	10	330
56.	2,4-Dichlorophenol	120-83-2	10	330
57.	1,2,4-Trichlorobenzene	120-82-1	10	330
58.	Naphthalene	91-20-3	10	330
59.	4-Chloroaniline	106-47-8	10	330
60.	Hexachlorobutadiene	87-68-3	10	330
61.	4-Chloro-3-methylphenol (para-chloro-meta-cresol)	59-50-7	10	330
62.	2-Methylnaphthalene	91-57-6	10	330
63.	Hexachlorocyclopentadiene	77-47-4	10	330
64.	2,4,6-Trichlorophenol	88-06-2	10	330
65.	2,4,5-Trichlorophenol	95-95-4	50	1600
66.	2-Chloronaphthalene	91-58-7	10	330
67.	2-Nitroaniline	88-74-4	50	1600
68.	Dimethyl Phthalate	131-11-3	10	330
69.	Acenaphthylene	208-96-8	10	330
70.	3-Nitroaniline	99-09-2	50	1600

	Semi-Volatiles	CAS Number	Detection Limits Low Water [c] ug/L	Low Soil/Sediment [d] ug/Kg
71.	Acenaphthene	83-32-9	10	330
72.	2,4-Dinitrophenol	51-28-5	50	1600
73.	4-Nitrophenol	100-02-7	50	1600
74.	Dibenzofuran	132-64-9	10	330
75.	2,4-Dinitrotoluene	121-14-2	10	330
76.	2,6-Dinitrotoluene	606-20-2	10	330
77.	Diethylphthalate	84-66-2	10	330
78.	4-Chlorophenyl Phenyl ether	7005-72-3	10	330
79.	Fluorene	86-73-7	10	330
80.	4-Nitroaniline	100-01-6	50	1600
81.	4,6-Dinitro-2-methylphenol	534-52-1	50	1600
82.	N-nitrosodiphenylamine	86-30-6	10	330
83.	4-Bromophenyl Phenyl ether	101-55-3	10	330
84.	Hexachlorobenzene	118-74-1	10	330
85.	Pentachlorophenol.	87-86-5	50	1600
86.	Phenanthrene	85-01-8	10	330
87.	Anthracene	120-12-7	10	330
88.	Di-n-butylphthalate	84-74-2	10	330
89.	Fluoranthene	206-44-0	10	330
90.	Benzidine	92-87-5	50	1600
91.	Pyrene	129-00-0	10	330
92.	Butyl Benzyl Phthalate	85-68-7	10	330
93.	3,3'-Dichlorobenzidine	91-94-1	20	660
94.	Benzo(a)anthracene	56-55-3	10	330
95.	bis(2-ethylhexyl)phthalate	117-81-7	10	330
96.	Chrysene	218-01-9	10	330
97.	Di-n-octyl Phthalate	117-84-0	10	330
98.	Benzo(b)fluoranthene	207-99-2	10	330
99.	Benzo(k)fluoranthene	207-08-9	10	330
100.	Benzo(a)pyrene	50-32-8	10	330
101.	Indeno(1,2,3-cd)pyrene	193-39-5	10	330
102.	Dibenz(a,h)anthracene	53-70-3	10	330
103.	Benzo(g,h,i)perylene	191-24-2	10	330

[c] Medium Water Contract Required Detection Limits (CRDL) for Semi-Volatile HSL Compounds are 100 times the individual Low Water (CRDL).

[d] Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Semi-Volatile HSL Compounds are 60 times the individual Low Soil/Sediment CRDL.

	Pesticides	CAS Number	Detection Limits Low Water [e] ug/L	Low Soil/Sediment [f] ug/Kg
104.	alpha-BHC	319-84-6	0.05	2.0
105.	beta-BHC	319-85-7	0.05	2.0
106.	delta-BHC	319-86-8	0.05	2.0
107.	gamma-BHC (Lindane)	58-89-9	0.05	2.0
108.	Heptachlor	76-44-8	0.05	2.0
109.	Aldrin	309-00-2	0.05	2.0
110.	Heptachlor Epoxide	1024-57-3	0.05	2.0
111.	Endosulfan I	959-98-8	0.05	2.0
112.	Dieldrin	60-57-1	0.10	4.0
113.	4,4'-DDE	72-55-9	0.10	4.0
114.	Endrin	72-20-8	0.10	4.0
115.	Endosulfan II	33213-65-9	0.10	4.0
116.	4,4'-DDD	72-54-8	0.10	4.0
117.	Endrin Aldehyde	7421-93-4	0.10	4.0
118.	Endosulfan Sulfate	1031-07-8	0.10	4.0
119.	4,4'-DDT	50-29-0	0.10	4.0
120.	Endrin Ketone	53494-70-5	0.10	4.0
121.	Methoxychlor	72-43-5	0.5	20.0
122.	Chlordane	57-74-9	0.5	20.0
123.	Toxaphene	8001-35-2	1.0	40.0
124.	AROCLOR-1016	12674-11-2	0.5	20.0
125.	AROCLOR-1221	11104-28-2	0.5	20.0
126.	AROCLOR-1232	11141-16-5	0.5	20.0
127.	AROCLOR-1242	53469-21-9	0.5	20.0
128.	AROCLOR-1248	12672-29-6	0.5	20.0
129.	AROCLOR-1254	11097-69-1	1.0	40.0
130.	AROCLOR-1260	11096-82-5	1.0	40.0

[e] Medium Water Contract Required Detection Limits (CRDL) for Pesticide HSL Compounds are 100 times the individual Low Water CRDL.

[f] Medium Soil/Sediment Contract Required Detection Limits (CRDL) for Pesticide HSL Compounds are 60 times the individual Low Soil/Sediment CRDL.

* Wherever the term "priority pollutant(s)" is used in this contract and in any references cited in this contract, it is intended to mean "Hazardous Substances List (HSL) Compound(s)," which include all compounds listed in this Exhibit.

** Specific detection limits are highly matrix dependent. The detection limits listed herein are provided for guidance and may not always be acheivable.

5.0 ANALYTICAL REQUIREMENTS

5.1 Introduction

In 1984, a preliminary site inspection of Resource Recovery was conducted, during which groundwater from the control well and monitoring well 2 (Figure 2.3) was collected. The analytical results provided by the assigned EPA contract laboratory for the organic components were below acceptable quality assurance control limits. The inorganic data was acceptable in terms of laboratory quality control, however, the control well exhibited higher inorganic concentrations than MW2 (Appendix D). To supplement and clarify this previous sampling effort, the USEPA has requested that all samples be analyzed for constituents on the EPA Hazardous Substance List.

5.2 Analytical Studies

Samples, including quality assurance samples, will be sent to a Contract Laboratory for Regular Analytical Services (RAS) priority pollutant screening. A Special Analytical Service (SAS) request will also be made for analysis of 2,4-D; 2,4,5-T; Silvex; and MCPA.

5.3 Quality Assurance

Quality assurance parameters for the field work (sampling Chain of Custody and document control) are discussed in Appendix A. Analytical quality of the contract laboratories is described in detail in IFB WA 84-A266, Chemical Analytical Services for Organics, and IFB WA 84-J091, Chemical Analytical Services for Inorganics. All contract laboratories are required to conform to these standards. SAS analysis will be conducted using EPA approved extraction, analytical and quality assurance techniques, e.g. Standard Methods for the Examination of Water and Wastewater, 15th Edition, Method 509B (Chlorinated Phenoxy Acid Herbicides). Identification and quantitification will be confirmed using at least two different chromatography columns, if GC/MS methods cannot be used.

5.4 Additional Analyses

If the soil analyses indicate the presence of 2,4-D; 2,4,5-T; Silvex; or MCPA, archived soil samples will be submitted for dioxin analysis.

Laboratory analysis and contaminant quantification in soil samples will be conducted for:

- 2,3,7,8-Tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD)
- 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF)
- Σ all 22 tetrachlorodibenzo-p-dioxin isomers (TCDDs)
- Σ all 38 tetrachlorodibenzofuran isomers (TCDFs)
- Σ all 14 pentachlorodibenzo-p-dioxin isomers (PeCDDs)
- Σ all 28 pentachlorodibenzofuran isomers (PeCDFs)
- Σ all 10 hexachlorodibenzo-p-dioxin isomers (HxCDDs)
- Σ all 16 hexachlorodibenzofuran isomers (HxCDFs)

5.4.1 Methodology

Basic analytical methodology is shown in the following generic dioxin extraction and analysis protocol:

- o spiking of weighed aliquots of sample with isotopically labelled PCDD and PCDF isomers which serve as internal standards
- o extraction and partition of PCDDs and PCDFs in the sample with organic solvents
- o Reduction of the solvent volume
- o cleanup of the raw extract with techniques which include acid and base extractions and elution chromatography
- o high pressure liquid chromatography may also be used to achieve further separation efficiency
- o quantitation of the PCDDs and PCDFs with High Resolution Gas Chromatography/Mass Spectrometry (HRGC/MS)

The above methodology should yield a lower limit of detection of approximately 0.1 ppb in a 10 g soil sample. Specific methodologies are described in Appendix B.

5.4.2 Rationale

The twelve most toxic isomers listed below are all within the tetra-, penta-, and hexa- PCDD and PCDF homolog groups (4.3). Homolog analyses represent a cost-effective screening procedure for the isomers of greatest concern:

2,3,7,8-tetra-CDD	2,3,7,8-tetra-CDF
1,2,3,7,8-penta-CDD	1,2,3,7,8-penta-CDF
1,2,3,6,7,8-hexa-CDD	2,3,4,7,8-penta-CDF
1,2,3,7,8,9-hexa-CDD	1,2,3,6,7,8-hexa-CDF
1,2,3,4,7,8-hexa-CDD	1,2,3,7,8,9-hexa-CDF
	1,2,3,4,7,8-hexa-CDF
	2,3,4,6,7,8-hexa-CDF

Sample extracts will be saved by the laboratory after homolog screening for subsequent specific isomer analysis, if the initial results indicate that further refinement of the data is justified.

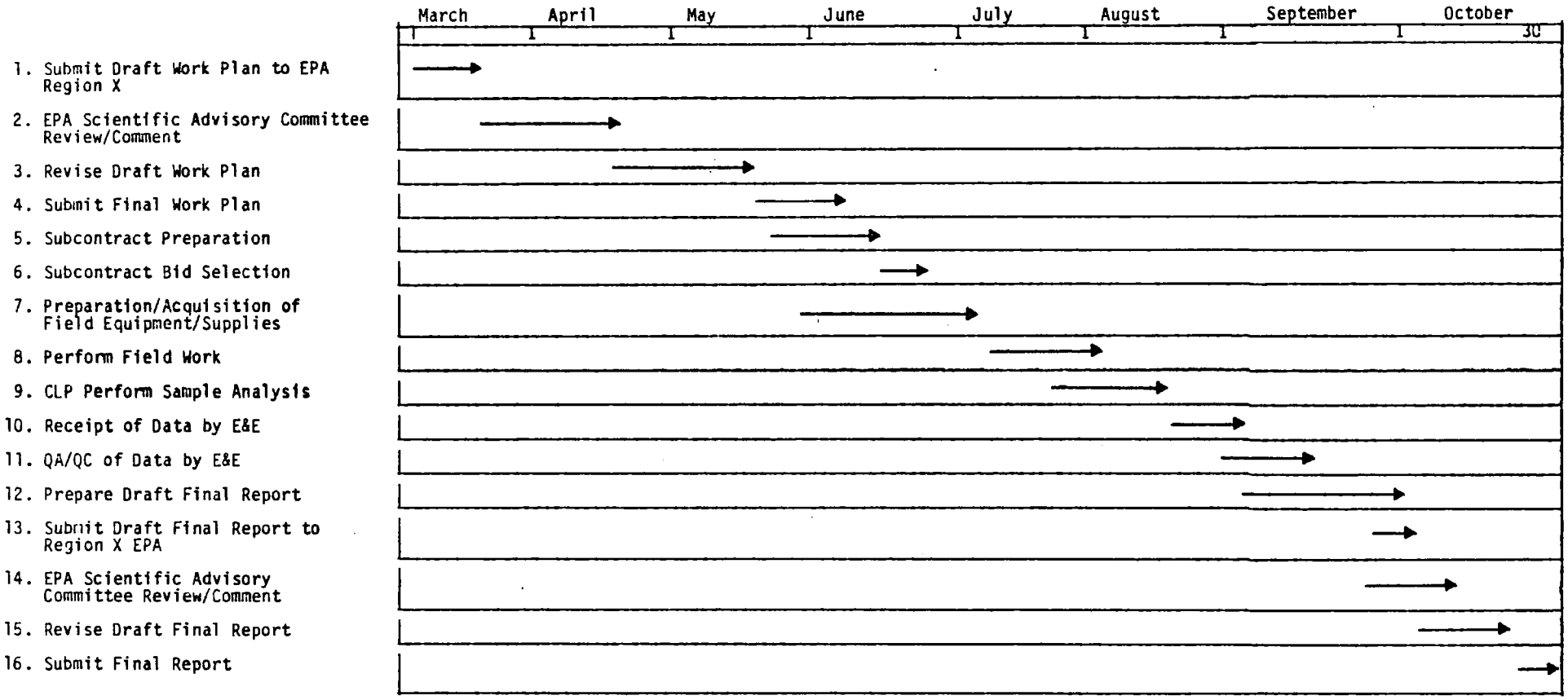
5.4.3 Quality Assurance

Quality control and quality assurance germane to sampling, sample handling and analytical procedures are outlined in Appendix A.

6.0 ANTICIPATED SCHEDULE

The anticipated schedule for this investigation is depicted in Figure 6.1.

6.1 ANTICIPATED SCHEDULE



REFERENCES

1.1 Sampling Guidance Manual For The National Dioxin Study - Final Draft Report, EPA, Office of Water Regulations and Standards. Washington, D.C. July, 1984.

2.1 Preliminary Site Inspection Report of Resource Recovery Corporation Pasco, WA. prep. by Ecology and Environment, January 8, 1985.

2.2 EPA Files on Resource Recovery Corporation (RRC). Monthly Activity Reports sent by RRC to WDOE.

2.3 EPA Files on RRC, Memos from Rhodia to various agencies documenting waste composition.

2.4 Personal communication with Larry Dietrich, January 29, 1985.

2.5 Resource Recovery Corporation, Industrial Waste Site Disposal Site Evaluation. prep. by WDOE, December 1973.

2.6 EPA Files on RRC, Resource Recovery, Inc., Pasco Disposal Facility Requirements for Facility Closedown and Site Monitoring.

3.1 EPA Files on RRC, Map of Survey for Resource Recovery, Inc., A.D. Stanley, Wash. Reg. No. 7890, Frankin County Fee No. 402472.

3.2 U.S. Weather Bureau. Local Climatological Summary: Tri-City Area, Kennewick-Pasco-Richland, WA. National Climatic Data Center, Asheville, NC.

3.3 EPA Files on RRC, Well Logs.

3.4 Basalt Waste Isolation Project, Annual Report - Fiscal Year 1980, RHO-BWI-80-100, document prepared for U.S. Dept. of Energy under contract DE-Ac06-77RL01030 by Rockwell International.

3.5 Summary Report - Groundwater Quality in the Vicinity of the Pasco Landfill, J-U-B Engineers, Kennewick, Washington, July 1983.

3.6 Evaluation of the Pasco Sanitary Landfill Waste Disposal Practices, J-U-B Engineers, Kennewick, Washington, June 1981.

3.7 WDOE files on RRC, Laboratory Results of Samples from Pasco Disposal Site on February 28, 1975 and June 2 and 3, 1975.

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN (QAPP)

REGIONAL PROGRAM OFFICER: J.E. OSBORN

PROJECT OFFICER:

QUALITY ASSURANCE OFFICER:

PROJECT CODE:

DATE INITIATED:

DATE APPROVED:

APPROVALS:

REGIONAL PROGRAM OFFICER:_____ DATE:_____

PROJECT OFFICER:_____ DATE:_____

QUALITY ASSURANCE OFFICER:_____ DATE:_____

TABLE OF CONTENTS

1.0 INTRODUCTION/OVERVIEW

Environmental Protection Agency (EPA) policy requires participation by all EPA contractors in a centrally managed quality assurance (QA) program. This requirement applies to all environmental monitoring and measurement efforts mandated or supported by EPA. Each Contractor generating data has the responsibility to implement adequate procedures that assure that the precision, accuracy, completeness, and representativeness of its data are known and documented.

Quality assurance procedures such as tracking, reviewing, and auditing must be implemented for all projects to ensure that technical and laboratory data are of known quality and that all project work is performed in accordance with professional technical standards, EPA and other governmental regulations and guidelines, and specific project goals and requirements. Outlined in this Quality Assurance Project Plan (QAPP) are the procedures to be followed during the EPA Region X Resource Recovery Investigation.

Quality assurance plans and standard operating procedures from state and federal agencies have been reviewed, amended, or incorporated, where appropriate.

The QAPP covers each of the following activities:

- o Review of project deliverables
- o Sample collecting, control, chain-of-custody and analysis
- o Field measurements
- o Equipment calibration, operation and maintenance
- o Document control
- o Subcontractor oversight

For project deliverables, the standard of quality is the normal quality associated with professional scientific work. Quality control of project deliverables is provided through technical review by peers and senior staff, and through periodic audits.

Field measurements and field testing are performed in accordance with standard operating procedures. Analytical samples are collected in the field according to standard operating procedures and sent to laboratories within the EPA Contract Laboratory Program (CLP). This program is described in The User's Guide to the EPA Contract Laboratory Program prepared by the Sample Management Office (SMO) in July 1984. Spikes and replicate samples are used to develop estimates of the quality of analytical data. Field audits of sampling and chain-of-custody procedures are used to verify that proper techniques are being followed. Field data compilations, tabulations, and analyses will be checked for accuracy. Calculation briefs and other data gathering tasks will be reviewed by project personnel.

For sample analysis, the constituents and levels of detection are usually developed on a case-by-case basis. The parameters to be analyzed during this study have been described previously in the site specific sampling plans.

Samples obtained during the site investigation might be used to confirm the presence of contamination, or might be used to establish responsibility in a remedial action. In either case, the quality requirements are specified by the project manager with the concurrence of the EPA Project Officer.

Equipment used to make field measurements is maintained and calibrated in accordance with established procedures. Records of calibration and maintenance are kept by assigned personnel. Field testing and data acquisition are performed in standard fashion following strict guidelines.

Document control procedures keep track of all documents used during the investigations. These procedures are also used to safeguard enforcement sensitive materials over the course of the studies.

2.0 PROJECT DESCRIPTION

The goal of the Resource Recovery Field Investigation is to detect migration in soil or water of hazardous materials outside known burial zones.

In order to reach this goal, the following tasks will be completed:

- o Acquisition of background data regarding the site
- o Design of a sampling scheme
- o Reconfirmation of groundwater flow data
- o Monitoring well installation with concurrent soil sampling
- o Groundwater sampling from new and existing wells
- o Analysis of soil and water samples
- o Interpretation of the analytical results
- o Final report with recommendations for future study

3.0 PROJECT ORGANIZATION

Figure 1 illustrates the project organization structure for this investigation.

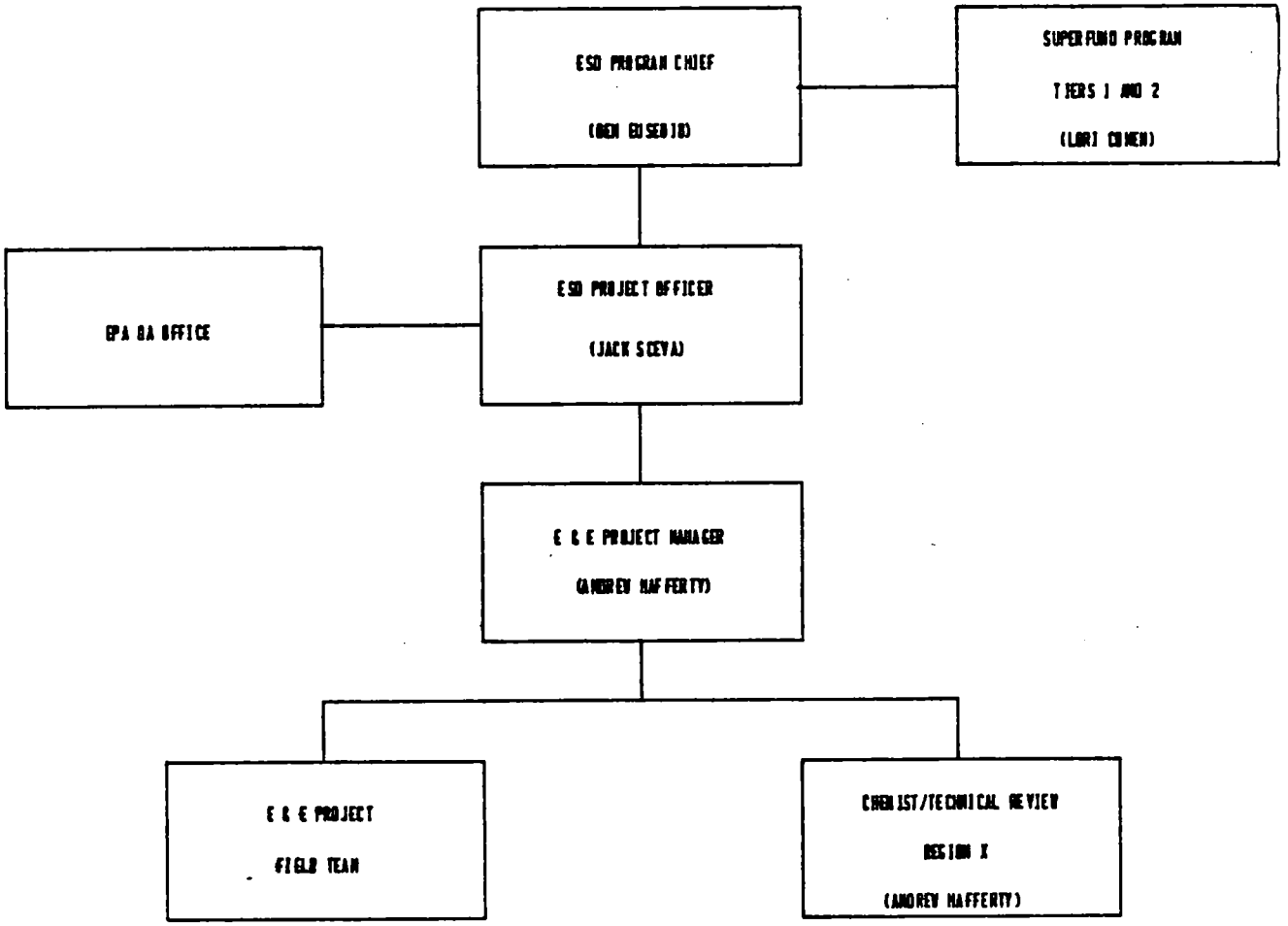


FIGURE 1 - PROJECT ORGANIZATION

Primary responsibility for project quality rests with the EPA Project Officer (RSPO) and the the E&E Project Manager (PM). Independent quality assurance review is provided by senior technical reviewers and QA auditors.

Where quality assurance problems or deficiencies requiring special action are uncovered, the PM and RSPO will identify the appropriate corrective action to be initiated and implemented. The RSPO and the EPA QA office will be informed of quality assurance problems that are program-related in nature or require special expertise not normally available to the project team.

4.0 QUALITY ASSURANCE OBJECTIVES

The general QA objectives for this project are to develop and implement procedures for obtaining and evaluating data that can be used to assess site hazards, develop and evaluate alternative remedial actions, and be legally defensible in a court of law. In order to provide legally defensible data, it is necessary that all measurement data have an appropriate degree of accuracy and reproducibility, along with assurance that samples collected are appropriately representative of actual field conditions. All samples also need to be collected and analyzed using proper chain-of-custody procedures.

The specific methods for determining the quality of analytical measurement data, in terms of precision, accuracy, and completeness are described in detail in this Appendix and in the following documents:

- The User's Guide to the EPA Contract Laboratory Program prepared by SMO July 1984
- Zone II REM/FIT Quality Assurance Manual

This Appendix also outlines the quality control procedrues to be implemented during field sampling and laboratory analytical activities.

5.0 SAMPLING PROCEDURES

This section describes the routine procedures to be followed by all personnel obtaining samples. These procedures are designed to ensure that: 1) all samples collected at the site are consistent with project objectives, 2) samples are identified, preserved, and transported in a manner such that the data are representative of the actual site conditions, information is not lost in sample transferral, and the data are legally defensible.

A detailed description of all sampling activities and procedures to be conducted during the this investigation are presented in the sampling plan. Included are discussions of:

- Specific sampling objectives
- Sample locations and basis for selection
- Sampling methodologies
- Required sampling equipment
- Decontamination procedures
- Sample numbers
- Data requirements

Quality assurance objectives for sample collection will be accomplished by a combination of the following items:

- Duplicate Samples. Duplicates will be submitted in order to evaluate the precision of laboratory results. The numbers of duplicates required in these projects will be at least 10% of the total of each sample type.

- Background Samples. Background water samples (surface and/or groundwater) will be collected to evaluate the site's impact on native water quality. A background soil sample will also be submitted to facilitate an evaluation of soil matrix effects on laboratory analyses.

- Blank Samples. A blank sample will be included in each shipping container. This blank will consist of either carbon free water, deionized water, or sterilized soil, depending on the analyses required.

- Chain-of-Custody. Standard EPA protocol will be followed in order to preserve the integrity of the samples between collection and analysis.

- Laboratory QA. Analytical procedures will be evaluated by using items such as surrogate spikes, matrix spikes, duplicates, reagent blanks, and inter-element correction checks.

5.1 Types, Locations, and Number of Samples

The types, locations, and number of samples to be collected have been determined based on available background data and are specified in the sampling plan. Groundwater and soil samples will be collected during the investigation. The total number of samples anticipated during the investigation, including QA samples, is 43.

Whenever possible, sampling locations will be documented by photographs. The sample location and type of sample will be indicated on a site sketch and in the field notebook.

5.2 Specific Sampling Objectives

Groundwater and subsurface soil samples will be collected at select locations during the project to provide an indication of the presence of contaminants. Samples will be analyzed at the EPA Region X laboratory or through the CLP. Required analyses will include; 2,4-D; MCPA; 2,4,5-T; Silvex; and priority pollutant scans.

5.3 Precision and Accuracy Targets for Litigation Quality Samples

The following precision and accuracy targets are intended for those sampling activities designed to produce enforcement quality results. All of the targets are optimistic estimates based on standard deviations of EPA approved analytical methods.

5.3.1 Precision

Precision is defined as measure of the mutual agreement among individual measurements of the same pollutant in a sample, secured under the same analytical protocols. Field and lab precision will be expressed as relative percent difference:

$$RPD = \frac{| X_1 - X_2 |}{\overline{x}} 100$$

where RPD = relative percent difference between duplicate concentrations

$| \ |$ = absolute difference between duplicates X_1 and X_2

$\overline{x}$ = mean value of duplicates X_1 and X_2

The goals for precision are related to the proximity of the sample value to the detection limit. At six times the method detection limit or less, the precision goal will be expressed in absolute concentration (detection limit) terms. Above the six times method detection limit level, the RPD limits specified by the EPA will apply.

5.3.2 Accuracy

Accuracy is defined as the degree to which the analytical measurement reflects the true level present. Overall project accuracy will be estimated by the recovery performance of the laboratory on blind control samples where possible. It should be noted that the "true" value of the blind control sample is not known. It actually determines the effect of the matrix on the recovery of added analytes, and not environmentally incurred analytes. The recovery of method efficiency markers (surrogate or internal standards) will be included as a measure of each sample's extract accuracy. Accuracy will be measured as percent recovery where:

$$\% \text{ Recovery} = \frac{X - B}{T} \times 100$$

where X = measured amount in sample after spiking
B = background amount in sample
T = amount of spike added to sample

The accuracy of the analyses will be gauged by assessing the data obtained for the internal standards added.

5.4 Sampling Techniques

All sampling will be conducted in accordance with E&E standard operating procedures. These procedures have been designed to ensure that consistent methods are employed and that unbiased samples representative of actual field conditions are collected. Detailed descriptions of the specific sampling techniques to be used during the investigations are presented in the sampling plan.

5.5 Sample Handling, Packaging, and Shipping

Specific procedures for sample handling, packaging, and shipping are determined by the assigned sample classification and by the anticipated sample concentration. Samples are classified as either environmental samples or hazardous samples. Concentrations are divided into low, medium, and high categories.

Environmental samples are normally low concentration and do not require the specific handling, packaging, and shipping procedures used with concentrated samples. The definition of a low concentration sample is:

- Low Concentration. This classification applies to those water and soil samples estimated to contain less than 10 parts per million (ppm) of any single contaminant. These samples in many cases will be collected at a distance from any direct source of contamination or have had a substantial reduction in contaminant concentration due to dilution.

Hazardous samples are medium to high concentration substances requiring specific handling, packaging, and shipping procedures. The definition of medium and high concentration is as follows:

- o Medium Concentration. This classification applies to those samples collected on-site and from areas where there is evidence of direct but diluted contamination. Protocols for medium concentration analysis are designed for samples containing from 10 ppm up to 15 percent of any one contaminant.

- o High Concentration. This classification applies to samples suspected to contain individual chemical contaminants in the concentration range from 15 to 100 percent. All high concentration samples are shipped to a Regulated Substances Laboratory for extraction and preparation.

In the Resource Recovery study area some background data collection including groundwater and soil sampling has already been performed. Results from these samples have shown that soils and groundwater can be classified as low concentration hazardous samples. As a result, all samples collected during this investigation will be considered low concentration and handled accordingly.

Specific sample handling, packaging, and shipping procedure are summarized below for environmental samples.

5.5.1 Environmental Samples

The following sample handling, packaging, and shipping procedures will be used for low concentration environmental samples collected.

a. Organic Water Analyses

Use of analytical contract laboratories requires that duplicate samples be collected for volatile organics analysis (VOA's). Samples for VOA's are collected in 40-milliliter (ml) glass vials equipped with Teflon-backed silicon septum screw caps. Bottles and septa are washed with detergent, rinsed with organic-free water, and dried one hour at 105°C.

Samples for extractables are collected in four 1-liter glass jugs with Teflon-lined caps. This reduces the chances of losing an entire sample due to container breakage. New bottles and liners are rinsed with methylene choride and dried by vacuum or other safe means until no solvent remains. For each Case (each sampling event is assigned a Case Number by EPA) of samples an extractable and VOA blank sample should be prepared, identified as a separate sample, and included with field samples shipped to a contract laboratory. Samples will be packed and iced to avoid breakage or contamination during shipment.

For each sample collected, complete one Organics Traffic Report and attach the sample labels to each sample container. Indicate sample concentration and matrix on each Traffic Report and provide the designated laboratory with information determining the specific analysis protocols to be followed. For each Case of samples, group all corresponding Traffic Reports, pack in a waterproof bag and include with the samples. Complete Chain-of-Custody records, sample tags, and other required documentation and include with the shipment. Pack samples to avoid breakage or contamination. Samplers will be thoroughly acquainted with all general and specific procedures for collecting and packaging samples (i.e., never use ice as a filler or packing materials, never pack glass- to-glass, etc.). Section 18 presents appropriate packaging guidelines for these samples.

b. Inorganics Water Analysis

Water samples for metals analysis are collected in one-liter high-density polyethylene bottles with solid polyethylene or polyethylene-lined caps. Bakelite caps are not acceptable. The bottles are cleaned with dilute nitric acid and thoroughly washed with distilled or deionized water. The samples are preserved with nitric acid to below pH 2. Nitric acid concentration must not exceed 0.15 percent if the sample is to be shipped via air cargo.

Water samples for ammonia and total organic carbon analyses are collected in 500 ml polyethylene bottles. The samples are preserved with sulfuric acid to below pH 2. The samples are then stored at 4°C.

Water samples for pH and fluoride analyses are collected in 500 ml polyethylene bottles and are stored at 4°C.

Water samples for cyanide analysis are collected 1-liter bottles and preserved with sodium hydroxide to a pH greater than 12. The samples are stored at 4°C.

Water samples for sulfide analysis are collected in 1-liter polyethylene bottles, and 0.04 percent zinc.

For each Case of samples, a field blank should be prepared and included with the shipment of field samples. For each sample collected, complete one Inorganics Traffic Report and attach the sample labels to each sample container. Indicate sample concentration and matrix on each Traffic Report to provide the designated laboratory with information determining the specific analysis protocols to be followed. For each Case of samples, complete all corresponding Traffic Reports, Chain-of-Custody records, sample tags, and other required documentation, pack in a waterproof bag and include with the samples. Samples must be packed to avoid breakage or contamination.

c. Organic and Inorganic Soil Analysis

Soil or sediment samples are collected in wide-mouthed glass jars equipped with Teflon-lined screw caps. Samples are preserved by cooling with ice or refrigeration at 4°C. Jars are cleaned with detergent and rinsed with tapwater and organics-free water.

For each sample collected, complete the appropriate Traffic Report and attach the sample labels to each sample container. Indicate sample concentration and matrix on each Traffic Report to provide the designated laboratory with information determining the specific analysis protocols to be followed. For each Case of samples, group all corresponding Traffic Reports, pack in a waterproof bag and include with the samples. Complete Chain-of-Custody records, sample tags and other required documentation and include with the shipment. Samples must be packed to avoid breakage or contamination. Table A.1 summarizes the types and sizes of containers used, the sample volume, preservation techniques, and maximum laboratory holding times.

5.6 Sampling Safety and Decontamination Considerations

While drilling monitoring wells in potential source areas and sampling subsurface soils in boreholes, an HNU systems P101 Photoionizer will be utilized for detection of volatile organic emissions from the sample area. Although no significant levels of volatile compounds are expected, this instrument will be employed for safety purposes. If high readings of volatiles are detected, appropriate safety actions will be taken in accordance with the specifications of the site safety plan. Additional site safety requirements for each sampling event will be specified in the site safety plan.

Decontamination procedures for each event are specified in the sampling plan. At a minimum the procedures discussed in the previous sections will be followed.

6.0 QUALITY ASSURANCE FOR FIELD MEASUREMENTS

This section describes the routine procedures to be followed by all personnel performing field measurements.

6.1 Water Level Measurements

The following procedures will be followed when measuring static and/or pumping water levels:

a) Before Entering the Field

- Identify on site monitoring wells to be measured.
- Identify the history of the well to be measured, if applicable, since last water level measurement; also identify the established measuring point for the particular well.

TABLE A.1

Sampling Handling Protocol

Type of Analysis	Number of Containers and Sample Volume (per sample)	Type and Size of Container	Preservation	Maximum Holding Time
Purgeable (Volatile) Organics	Two (2); vials filled completely, no air space	40 ml glass vial, Teflon-backed septum	Cool to 4°C (ice in cooler)	14 days
Extractable Organics, PCB, Pesticides, Herbicides	Four (4); total volume approx. 1 gallon; bottle is filled 5/6 full *	One liter bottle with Teflon-lined cap	Cool to 4°C (ice in cooler)	Must be extracted within 7 days
Metals	One (1); bottle is filled 7/8 full	1 liter polyethylene bottle with Teflon-lined cap	Nitric acid is below pH of 2 (approx. 1.5 ml Con HNO_3 per liter)	6 months
Inorganic Soils/Sediments	One (1); 8 ounce jar filled 3/4 full	8 ounce wide-mouth jar with Teflon-lined cap	Cool to 4°C (ice in cooler)	Case-specific
Organic Soils/Sediments	Four (4); 4 ounce jar filled 3/5 full*	4 ounce wide-mouth jar with Teflon-lined cap	Cool to 4°C (ice in cooler)	Case-specific

* Sample volumes will be doubled to allow for SAS Herbicide analyses.

- o Inform applicable agencies of pending field activities.

- o Obtain permission to measure domestic or private wells.

b) In the Field

- o Check wells listed on inventory and resurvey elevations.

- o If possible, the depth of the well should be sounded at the first-time water level measurement. Record measured depth.

- o Record the measuring point (MP) at the well-head. The same measuring point must be used for subsequent measurements.

- o Record the distance from the measuring point to the ground level and define "ground level" at that well site, i.e., cement platform, average ground surface consistent with "ground levels" used in previous water level measurements at that site (ground level elevations will be surveyed during initial stages of program).

- o Turn on the water level instrument for measuring wells. Lower the probe slowly into the well, minimizing contact with the well casing. When the probe contacts the water, the line is marked at the measuring point; the distance from the mark to the nearest "tape band" is measured and added to (or subtracted from) the band reading to obtain the depth to water (to within 1/10-inch). The measurement should be repeated twice. Record the depth to water. The water level instrument will have been calibrated within the last month.

- o If an electrical sounder is not available, a steel tape can be used for water level measurement. Use a 500-foot tape, calibrated to 0.01 of a foot, with a lead weight attached to the end.

  Coat the bottom two to three feet of the tape with carpenters chalk. Lower the tape into the well until the basal portion is submerged. Continue to lower the tape until the next foot-mark is exactly even with the measuring point. Record this foot-marker. Reel tape from well. Determine the water line on the chalked portion of the tape and subtract from the previously recorded foot-marker. Repeat measurement three times or until two readings within 0.02 feet of each other have been obtained.

- o Record all information on Field Water Level Measurement Form

- o Remove all equipment and decontaminate.

6.2 Field Parameters

Conductivity, temperature, and pH will be taken when each water sample is collected. A conventional pH meter with a combination gel-filled electrode will be used for field pH determinations. A combination conductivity-temperature-salinity meter will be used for the remaining field parameter measurements.

All instruments will be periodically calibrated to ensure accuracy. All probes will be thoroughly rinsed with distilled water prior to any measurements.

Regardless of the sample collection method (grab, bailer, or pump) a representative water sample will be placed in a nalgene tranfer bottle used solely for field parameter determinations. Measurements will be made as follows:

- The transfer bottle will be rinsed with sample water prior to filling.
- Probes will be immersed in the transfer bottle and measurements will be taken accordingly.

6.3 Geologic Logs

In order to characterize the encountered sediments, a complete log of all lithologies encountered during drilling will be maintained. This includes lithologic, mineralogic and hydrologic descriptions along with notations on drilling speed, drill-bit behavior, drill rig injection rates, cuttings return rates, and pull-down pressures as the rig encounters different materials.

Major components of the log to be completed consist of the following:

- At selected intervals the geologist will obtain a sample of the drill cuttings from the auger flights. Cutting depth will be noted.
- The sample will be characterized according to the Unified Soils Classification System. The color of the cuttings will also be recorded using the Munsell System.
- The grading, sorting, and percentage of gravel, sand, silt, or clay will be noted.
- Characterization of particles will include size, shape, and mineral composition.
- Clays will be characterized relative to their wetness, stiffness, and plasticity.

- o Moisture of all the cuttings will be noted along with the depth at which groundwater is first encountered.

- o Drilling speed and rig behavior will be noted to help verify the nature of the material encountered by the drill bit.

- o When obtaining samples with a split spoon sampler, blow counts will be recorded for 6-inch penetration of a 140-pound weight free falling 30 inches.

- o The on-site geologist will be responsible for compiling all of the above information in a Borehole log.

The drilling and completion of each monitoring well will be overseen by a geologist/hydrogeologist responsible for the collection of lithologic samples, description of lithology according to the Unified Soil Classification System (USCS), selection of perforated intervals for casing screens, and determination of final well depth.

6.4 Surveying

Following the completion of each monitoring well installation, the measuring points of each well will be surveyed to a vertical accuracy of 0.01 feet.

6.5 Groundwater Sample Collection

The following procedures will be followed when collecting groundwater samples:

a) Before Entering the Field

- o Determine diameter of the well. This will aid in determining size of bailers to be used when sampling. The diameter of the well is also used in calculation of the well's static water volume for determining volume to be purged prior to sampling.

- o Determine the depth of the perforated interval of the well. This indicates the depth at which groundwater will be entering the well.

- o Determine the total depth of the well. This will enable calculation of the well's static water volume.

- o Identify the type of casing materials, i.e., PVC or steel.

b) In the Field

Actual sampling of a monitoring well may be divided into three parts: 1) measurement of well volume and water level, 2) evacuation of static water, and 3) obtaining the water sample. All information

pertinent to sampling such as the well designation, the time of sampling, and volume of water purged will be recorded in the sampling log book.

- o Take a water level measurement prior to bailing.
- o Attach clean bailer to the nylon line and purge three to five times the volume of water originaly standing in well.
- o Obtain sample for field measurements and determine pH, temperature, and conductivity.
- o Rinse sample container with water to be analyzed and collect sample.
- o Determine physical characteristics of sample such as odor, color, and turbidity.
- o Photograph sample location and conditions.
- o Label each container and complete appropriate forms.
- o Package samples and ship to laboratory.

6.6 Subsurface Soil Sample Collection

The following procedures will be followed when collecting soil samples:

- o Explain the purpose of sampling to the driller.
- o Record weather conditions and other on-site particulars.
- o Photograph sample locations and conditions.
- o Direct the drilling so that samples are obtained at the proper intervals.
- o E&E samplers will use a clean stainless steel spatula to collect each discrete sample from the auger flights.
- o A discrete sample has been defined as the sum of all soils collected at a rate of four ounces per foot of auger flight over ten foot sections of vertical drilling depth starting at the surface.
- o Discrete samples will be homogenized and screened to remove unrepresentative material.
- o Each discrete sample will be placed in a clean glass jar; sealed, labeled, and stored in ice cooled chests until all samples designated for a composite are available.

- Equal volumes of the discrete samples will be used to generate the composites.

- Each discrete sample and an aliquot of each composite will be archived.

- All samples, composites, and aliquots will be held in teflon-lined glass jars identified and documented following Sample Management Office procedures to insure accurate shipment and storage record keeping and Chain-of-Custody protocol.

- Archive samples will be stored on ice prior to and during shipment to a designated archive site.

- Package one aliquot from each composite according to specific shipping requirements.

- Store packaged samples at 4°C until shipped to designated laboratories.

- A second aliquot will be given to Mr. L. Dietrich or his representative.

7.0 QUALITY ASSURANCE FOR DRILLING

Prior to entering the field a bid specifications package will be prepared and submitted to at least three (3) qualified driller to solicit bids. This package will present the statement of work for all drilling activities and will address well specifications, a project schedule, soil sampling needs, decontamination, and site safety.

Upon receipt of the bids, the qualified low-cost bidder will be selected by an E&E technical committee based on unit costs, total costs, and experience.

Quality assurance for all drilling and well construction activities will be maintained primarily through field observations in accordance with E&E standard operating procedures for well design and construction, geologic logging, water level measuring, and sampling.

8.0 SAMPLE CONTROL/CHAIN-OF-CUSTODY

This section describes standard operating procedures for sample identification and chain-of-custody. The purpose of these procedures is to ensure that the quality of the samples is maintained during collection, transportation, and storage prior to analysis. Sample control and chain-of-custody procedures applicable to the EPA Contract Laboratory Program are presented in the User's Guide to the EPA Contract Laboratory Program prepared by the Sample Management Office in July 1984. These procedures will be followed for all samples collected during this investigation.

8.1 Standard Operating Procedures

Sample identification documents must be carefully prepared so that identification and chain-of-custody can be maintained, and sample disposition can be controlled. The sample identification documents to be used include:

- Inorganic and Organic Traffic Reports, including sample identification numbers
- Chain-of-Custody records
- Custody seals
- Field notebooks
- Special Analytical Services Request forms

The Traffic Report forms are the primary forms used for sample identification. The pre-printed and pre-numbered adhesive sample labels affixed to the Traffic Reports will be secured to the sample containers by the sampler. Forms will be filled out with waterproof ink and where necessary, the label will be protected from water and solvents with clear label protection tape.

Each Traffic Report will include the following information:

- Sample number
- Project code/Case number
- Sample site name/code
- Sampling date
- Sampling personnel
- Shipping method and date
- Sample description
- Sample matrix and concentration
- Sample volume and number of containers
- Sample destination
- Preservation used
- Analyses required
- Special handling procedures
- Container lot numbers

Upon returning from the field, sample numbers will be recorded in the sample log book. Remaining Traffic Reports will be distributed to appropriate organizations and personnel. Complete instructions for use of Traffic Reports are given in the User's Guide to the EPA Contract Laboratory Program.

8.2 Chain-of-Custody

To document sample possession, Chain-of-Custody procedures are followed. These procedures are outlined in the sections below.

Field Custody Procedures

- Collect only enough samples to provide a good representation of the media being sampled. To the extent possible, the quantity and types of samples and sample locations are determined before the actual field work. As few people as possible should handle samples.

- The field sampler is personally responsible for the care and custody of the samples collected until they are transferred or dispatched properly.

- The project manager determines whether proper custody procedures were followed during the field work and decides if additional samples are required.

Transfer of Custody and Shipment

- Samples are accompanied by a Chain-of-Custody Record. When transferring samples, the individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents sample custody transfer.

- Samples are packaged properly for shipment and dispatched to the appropriate laboratory for analysis, with a separate Chain-of-Custody Record accompanying each shipment (one for each field laboratory). Shipping containers are padlocked or sealed with Custody Seals for shipment to the laboratory. The method of shipment, courier name(s), and other pertinent information are entered in the "Remarks" section of the Chain-of-Custody Record.

- All shipments are accompanied by the Chain-of-Custody record identifying its contents. The original record accompanies the shipment, and the yellow copy is retained by the project manager.

- If sent by mail, the package is registered with return receipt requested. If sent by common carrier, a Bill of Lading is used. Air freight shipments are sent collect. Freight bills, Postal Service receipts, and Bills of Lading are retained as part of the permanent documentation.

Laboratory Custody Procedures

- A designated sample custodian accepts custody of the shipped samples and verifies that the information on the Sample Identification number matches that on the Chain-of-Custody records. Pertinent information as to shipment, pickup, and courier is entered in the "Remarks" section. The custodian then enters the Sample Identification number data into a bound log book, which is arranged by project code and station number.

The laboratory custodian uses the Sample Identification number or assigns a unique laboratory number to each sample and ensures that all samples are transferred to the proper analyst or stored in the appropriate secure area.

- The custodian distributes samples to the appropriate analysts. Laboratory personnel are responsible for the care and custody of samples from the time they are received until the sample is exhausted or returned to the custodian.

- When sample analyses and necessary QA checks have been completed in the field laboratory, the unused portion of the sample must be disposed of properly. All identifying tags, data sheets, and laboratory records are retained as part of the permanent documentation. Sample containers and remaining sample material are disposed of properly.

8.3 Custody Seals

When samples are shipped to the laboratory, they must be placed in padlocked containers or containers sealed with custody seals to ensure their integrity.

Two seals must be placed on each shipping container (cooler), one at the front and one at the back. Clear tape should be placed over the seals to ensure that seals are not accidentally broken during shipment.

8.4 Field Notebooks

In addition to Sample Identification Numbers and Chain-of-Custody records, a bound field notebook will be maintained by the sampling team leader to provide a daily record of signficant events, observations, and measurements during field investigations. This record will include water level data, field measurements, personnel, and drilling information. In addition, field data forms will be used for the various tasks to aid in data acquisition and to ensure that all pertinent information is recorded. All entries in the field notebooks will be signed and dated. The field notebooks will be kept as a permanent record.

These notebooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during the project and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings.

8.5 Corrections to Documentation

As previously stated, all original data recorded in Field Notebooks, Sample Identification Tags, Chain-of-Custody records, and other forms are written with waterproof ink. None of these documents will be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document assigned to one individual, that individual may make corrections simply by crossing a line through the error and entering the correct information. The erroneous information will not be obliterated. Any subsequent error discovered on a document will be corrected, initialed, and dated by the person who made the entry.

9.0 EQUIPMENT CALIBRATION, OPERATION, AND MAINTENANCE

All instruments and equipment used during the field investigation will be operated, calibrated, and maintained according to the manufacturers guidelines and recommendations. Operation, calibration, and maintenance will be performed by personnel who have been properly trained in these procedures. A routine schedule and record of instrument calibration and maintenance will be maintained throughout the duration of the study.

10.0 ANALYTICAL PROCEDURES/DATA REQUIREMENTS

Any samples collected during this project will be analyzed for the appropriately selected parameters in accordance with the standard analytical procedures established by the EPA for the Contract Laboratory Program.

The purpose of the EPA Contract Laboratory Program is to provide analytical data of known quality from which to determine the nature and extent of contamination, base assessments of risk, institute remedial actions, or initiate enforcement actions to identify and mitigate threats to public health and environment. Protocols and methodologies are designed by the EPA to provide data of known quality in strict accordance with Quality Assurance procedures and Chain-of-Custody and document control requirements. Information on the types of samples which are analyzed and the parameters for which the samples are analyzed is presented in the User's Guide to the EPA Contract Laboratory Program.

10.1 General Laboratory Requirements

In general, the laboratories used will adhere to those recommendations as promulgated in 21 CFR Part 58, "Good Laboratory Practices", criteria described in "Methods for Chemical Analysis of Water and Wastes, 1979 (EPA-600/4-79-020) and the requirements of the EPA Contract Laboratory Program.

1. Purity of Standards, Solvents, and Reagents

All reagents will be of the standard laboratory quality obtainable. Where applicable, reference standards solutions will be traceable to National Bureau of Standards (NBS). Each new lot of reagent grade chemicals shall be tested for quality of performance. These shall be tested for quality of performance. These shall be tested by injection into a gas chromatograph (GC) to determine the extent of interferences in the GC profile.

2. Glassware

All glassware used in organic analyses requires special cleaning. Plasticware will not be used because other organic compounds may be extracted by solvents and produce interferring peaks on the gas chromatogram. Preparation of glassware and other sample containers is outlined in Section 5.5.

3. Analytical Analyses

a. Laboratory pure water is prepared by a special deionized water system augmented by individual filter cartridges and polishers located at each outlet point. The polishers include special particulate filters, organic resins, and inorganic resins.

b. Specially deionized water which has been boiled and purged with nitrogen gas will be used for volatile/priority pollutant analyses. Water prepared in this manner should be free of contamination and be free of interference peaks when injected into the gas chromatograph.

c. Field Blank

All water samples submitted for volatile organic contaminants or priority analysis must be accompanied by a field blank. Field blanks are prepared in the field prior to shipment to the laboratory, using organic-free water. They are stored alongside the collected samples and shipped back to the laboratory for analysis. Field blanks are analyzed with the field samples and they indicate whether the sample bottles were exposed to contaminants during handling and transit or if samples were cross-contaminated. Where possible, the laboratory should not be told which sample is the field blank.

d. Method Blank/Reagent Blank

1) A laboratory pure water blank is analyzed along with all water samples submitted for analyses. The method blank is processed through all procedures, materials, and labware used or sample preparation.

2) In cases of non-aqueous samples, reagent blanks serve as method blank.

e. Calibration Standards

A calibration standard is prepared in the laboratory by dissolving a known amount of a pure compound in an appropriate matrix. The final concentration calculated from the known quantities is the true value of the standard. The results obtained from these standards are used to generate a standard curve and thereby quantitate the compound in the environmental sample. A minimum of three (3) calibration standards will be used in generating a standard cure for all analyses. Specific requirements are outlined in the EPA Contract Laboratory Program.

f. Check Standard

A check standard is prepared in the same manner as a calibration standard. The final concentration calculated from the known quantities is the true value of the standard. The important difference in a check standard is that it is not carried through the same process used for the environmental samples, but is injected directly onto the gas chromatographic column. A check standard result is used to validate an existing concentration calibration standard file or calibration curve.

The check standard can provide information on the accuracy of the total analytical method independent of various sample matrices. Specific requirements and procedures for calibration and check standards are outlined in the EPA Contract Laboratory Program.

g. Control

A control is a sample of known value used to validate the analytical procedure. Control samples are prepared by the unit supervisor or his delegate and used each time a determination is made. One control is used for every ten samples and the value obtained must fall within $\pm$10% of the true value for validation.

h. Spike

A sample spike is prepared by adding a known amount of a pure compound to the environmental sample (before extraction for extractables), and the compound is the same as that being assayed for in the environmental sample. These spikes simulate the background and interferences found in the actual samples and the calculated percent recovery of the spike is taken as

measure of the accuracy of the total analytical method. When there is no change in volume due to the spike, it is calculated as follows:

$$P = \frac{100(O-X)}{T}$$

P = Percent recovery
O = Measured value of analyte
X = Measured value of analyte concentration in the sample before the spike is added

Tolerance limits for acceptable percent recovery are established in the EPA Contract Laboratory Program.

i. Internal Standard

Prepared by adding a known amount of pure compound to the environmental sample, and the compound selected is not one expected to be found in the sample, but is similar in nature to the compound of interest. Internal standards are added to the environmental sample just prior to analysis. (NOTE: Internal standards and surrogate spikes are different compounds. The internal standard is for quantification purposes using the relative response factor, while surrogate spikes indicate the percent recovery and therefore the efficiency of the methodology.)

j. Matrix Spike/Duplicate

Aliquots are made in the laboratory of the same sample and each aliquot is treated exactly the same throughout the analytical method. Spikes are added at approximately ten times the method detection limit (see Form V for the spike compounds used). The percent difference between the value of the duplicates, as calculated below, is taken as a measure of the precision of the analytical method.

$$PD = \frac{2(D_1 - D_2)100}{(D_1 + D_2)}$$

PD = Percent Differenct
D_1 = First sample value
D_2 = Second sample value (duplicated)

The tolerance limit for percent differences between laboratory duplicators should not exceed 15 percent for validation.

K. Quality Control Check Samples

Inorganic and organic control check samples are available from EPA Cincinnati free of charge and shall be used each quarter as a means of evaluating analytical techniques of the analyst.

10.2 Data Requirements

The contaminants of interest during this study are the priority pollutants and selected phenoxy herbicides.

10.3 Laboratory Performance

EPA Contract Laboratory performance is continually monitored through ongoing Quality Assurance evaluations conducted by the Environmental Monitoring and Systems Laboratory/Las Vegas (EMSL/LV). These evaluations consist of periodic reviews of analytical data and supporting documentation complemented by quarterly on-site laboratory inspections.

On site laboratory evaluations ensure continuing laboratory adherence to analytical and QA/QC procedures and that overall performance meets the requirements of the EPA Contract Laboratory Program. EMSL/LV also supports the EPA Contract Laboratory Program by developing and/or approving all methods, standards and protocols used by contract laboratories.

10.4 Analytical Data Review

The QA review performed by E&E involves extensive check of the data from the analytical laboratory to ensure that all of the contract QC criteria have been met. Every component of the data package is inspected.

11.0 QUALITY CONTROL PROCEDURES

Quality control of the data will involve both the collection of field sample duplicates and blanks (described in the sampling plan)

laboratory analysis of the samples, and evaluation of the data. In addition to the procedures for sample collecting and handling described in this plan, it is anticipated that EPA's standard quality control procedures for the Contract Laboratory Program will be used.

To assure that all data generated is of known quality, the following internal laboratory and field quality control methods shall be implemented:

Field Activities

- At least one duplicate sample of each sample type will be collected.
- The total number of duplicates collected for each sample type will be at least 10% of the total number of samples collected.
- One transfer/transport blank (water only) will be included in each shipping container.

Laboratory Activities

- One set of calibration standards, either single point or full range, will be analyzed during every 8-hour shift.
- One set of reagent and solvent blanks will be analyzed daily.
- At least one sample will be analyzed in replicate with each batch of 10 or less samples.
- At least one spike sample will be analyzed with each batch of samples.
- An EPA Quality Control sample or NBS certified sample will be analyzed if available.
- Quality Control charts should be maintained.

12.0 DATA ASSESSMENT PROCEDURES

Analysis of the analytical data will be performed in accordance with standard procedures outlined in the CLP for the EPA Contract Laboratory Program. These procedures specify the documentation needed to complete an evaluation of the data. They also define acceptable accuracy and precision criteria that must be met for the data to be judged valid.

Accuracy is defined by the contract laboratory program as a percent recovery for a spiked sample for organic analysis. Both matrix spikes and surrogate spikes are used to evaluate the data for accuracy. Matrix spikes are actual samples spiked with a representative group of priority pollutants. One sample for each set of samples or for each 20 samples (whichever is the more frequent) is required to be split for matrix spike analysis. Surrogates are required to be spiked into every sample. Inorganic analysis requires a matrix spike recovery for all parameters analyzed and an ICP interference check for those metals analyzed by inductively coupled plasma.

Precision is defined by the EPA Contract Laboratory Program as the relative percent difference of matrix spike recoveries for two matrix spikes of the same sample (matrix spike [MS] and matrix spike duplicates [MSD] recoveries.

13.0 DATA MANAGEMENT REDUCTION, VALIDATION, AND REPORTING

All raw data generated from project sampling tasks and used in project reports will be appropriately identified and will be included in a separate appendix within the final report.

Validation of all analytical data will be performed by senior chemists at Ecology and Environment, Inc. Laboratories will be required to submit results which are supported by sufficient back-up data and QA/QC results to enable the reviewer to conclusively determine the quality of the data. Validity of all data will be determined based on EPA required precision and accuracy assessments. Upon completion of the review, the senior chemist will be responsible for developing a QA/QC report for each analytical data package. All data will be stored and maintained according to the procedures outlined in Section 14.0. Where test data have been reduced, the method of reduction will be described in the report.

14.0 DOCUMENT CONTROL

The purpose of the document control program is to ensure that all project documents issued to or generated by participating personnel are accounted for when a project is completed. This program includes a serialized numbering system, a document inventory procedure, and a filing system. The procedures described below will be followed during the investigation to provide proper inventory, custody and storage of all project documents.

14.1 Responsibilities

The site project manager has responsibility for the overll document control program and is responsible for the maintenance of the document control system. Project personnel are responsible for project documents while working on the investigation.

14.2 Accountable Documents

Almost all project-related materials used or generated by a study are accountable documents. Examples incude project notebooks, logbooks, field data forms, field notebooks, Traffic Reports, Chain-of-Custody Records, analytical data, maps and photographic prints. Each completed document is listed in a project inventory and filed in the project file.

Field Documents

EPA and the Sample Mangement Office (SMO) provide serialized (numbered) documents for use in the field and in the CLP. Such documents include the following:

- Chain-of-Custody
- Traffic Reports (organic, inorganic, and hazard)
- Special Analytical Services Request Forms
- Custody Seals

These documents are distributed for sampling activities. Proper use of these documents is outlined in Section 18.0 and the User's Guide to the EPA Contract Laboratory Program. It is the responsibility of field personnel and project managers to ensure that these documents are used appropriately, filed correctly, and distributed to the designated organizations.

In addition to these documents, field notebooks, field data forms, calculation briefs, and photographs are subject to inventory and control procedures.

All entries to the field notebook and field data forms are made in waterproof ink. Each entry has the sample location, station number, and sample identification number. All in-situ measurements and field observations are recorded with all pertinent information necessary to explain and reconstruct sampling operations. A record of all serialized document numbers is completed in matrix format either in the notebook or on separate attachments.

Each page of a field notebook and calculated briefs is dated and signed by all individuals making entries on that page. The project manager and the field team on duty are responsible for ensuring that field notebooks are used during all monitoring activities and are stored safely. Any lost, damaged, or voided field notebooks are reported to the project manager.

Photographs that show field activities and monitoring locations are numbered to correspond to field notebook entries. The names of the photographer and witness, date, time, site location, and site description are entered sequentially in the field notebook as photos are taken.

Once developed the photographic prints are labeled and stored safely.

Corrections to Field Documentation

As previously noted, all original data recorded in logbooks, field notebooks, calculation briefs, field data forms, traffic reports, custody records, and other data sheet entries are written with waterproof ink. Errors discovered on an accountable document will be corrected by the person who made the entry. Corrections must be initialed and dated.

If a sample identification number is lost in shipment, or was never prepared for a sample(s), or a properly labeled sample was transferred without a formal Chain-of-Custody Record, a written statement is prepared detailing how the sample was collected, air-dispatched, or hand-transferred to the laboratory. The statement will include all pertinent information, such as entries in field notebooks regarding the sample and whether the sample was in the sample collector's physical possession or in a locked compartment until hand-transferred to the laboratory. Copies of the statement are distributed to the project managers.

Consistency of Field Documentation

Before the release of a final analytical report, each laboratory assembles documents and cross-checks information on corresponding sample identification numbers, chain-of-custody records, bench sheets, laboratory logbooks, and other logbooks to ensure that data pertaining to each particular sample are complete and consistent throughout the record. The project manager then cross-checks field documents to ensure that the information recorded corresponds with that of the laboratories and is consistent throughout the project record.

14.3 Other Project Documents

Materials that are not used in field activities include project notebooks and project logbooks, test analyses, calculation briefs, maps, diagrams, etc. Maintaining these and other documents, including reference materials, laboratory reports, and project reports are the responsibility of the project manager until the closed project file is assembled. The project manager will oversee that documents are labelled, filed, and stored in accordance with their classification.

All draft reports are dated and the first page is stamped "draft". The author is responsible for distributing draft reports for internal review and preparing the appropriate transmittal memorandum to the requestor.

Project Logbook

This book keeps a log of the samples collected in the field. Samples are logged upon return from the field. The notebook becomes part of the project file and is filed by the project manager.

14.4 Filing System

While the project is ongoing an active project file is maintained. A file inventory will accompany the project file. The EPA recommended file format is as follows:

- Project Plan
- Project Activities Logbooks
- Field Notebooks
- Field Data Forms and Compulation Forms
- Sample Identification and Control Documents
- Chain-of-Custody Records
- Analytical Logbooks, Lab Data, Calculations, Bench Cards, Graphs, etc.
- Testing Analyses and Calculation Briefs
- Project Notebook
- Reference Materials, Literature
- Sample Inventory
- Project Inventory Logbooks (Check-out Logs)
- Litigation Documents
- Miscellaneous: Photos, Maps, Drawings, etc.
- Final Report

Once placed in the closed project file, documents may be checked out only through a designated representative. Classified documents are not included in the project file. They are kept in a separate secured area classified as "Enforcement Sensitive."

Upon closing a file, a detailed inventory of pertinent documents will be provided. The primary purpose of the file inventories is to provide a directory for those looking at the file or for litigation/ discovery purposes. With this objective in mind, the project manager identifies individual documents that need to be listed on the project inventory. The inventory should include a brief description of each item and its document control number. The project inventory then becomes a part of the closed project file.

14.5 EPA Enforcement Classifications and Handling Procedures

Documents that are classified by EPA as enforcement materials will be handled according to procedures described in this section. EPA devides enforcement materials into three classifications:

- o General Enforcement
- o Enforcement Confidential
- o Enforcement Sensitive

"Enforcement Sensitive" are all materials that contain information directly related to the government's case. These materials include names of informants, identification of witnesses and their testimony, settlements positions, discussions or analyses of weaknesses in the government's case, and other similar information.

"Enforcement Confidential" are all materials that have not been reviewed or checked for accuracy, and thus should not be generally distributed or otherwise made public. These materials include draft documents, results of analyses that have not been verified, internal memoranda, and other similar documents.

"General Enforcement" materials are all other materials that are accumulated during the development of an enforcement case. These include materials that document statutory or regulatory violations.

Procedures for Handling

All enforcement files are secured in locked file cabinets or equally secure areas during other than normal working hours, unless files are personally attended by a person authorized to have access to such files.

A continuous and permanent record is maintained of all persons who access enforcement files, including for each file: person having access, date and period of access, and location of file.

Any employee who is not a member of the project FIT staff or management is not allowed immediate or direct access to enforcement files without approval of the responsible project manager or other designated management staff.

15.0 AUDIT PROCEDURES

The Quality Assurance Manager (QAM) will monitor and audit the performance of the QA procedures outlined in the QAPP. The QAM will conduct field and office audits which will ensure that the information being gathered is reliable and of good quality.

Field Audits

The QAM may schedule audits of field activities at various times to evaluate the execution of sample identification, sample control, Chain-of-Custody procedures, field documentation, and sampling operations. The evaluation is based on the extent to which the applicable SOPs are being followed.

Field documents pertaining to sample identification and control will be examined for completeness and acuracy. Field notebooks will be reviewed to see that all entries are dated and signed and that the contents are legible, written in ink, and contain accurate and inclusive documentation of project activities. Because the notebook forms the basis for reports written later, it will contain only facts and observations. Language will be objective, factual, and free of personal interpretations or other terminology that might prove inappropriate.

The auditor will also check to see that Chain-of-Custody procedures are being followed and that samples are being kept in custody at all times and are locked to prevent tampering.

Sampling operations will be evaluated to determine if they are performed as stated in the project plan or as directed by the project manager. The proper number of samples will be collected at the assigned locations. The auditor checks to determine that the samples are in proper containers and are properly preserved.

The QAM also determines if the required field measurements and quality assurance checks are being performed and documented as directed.

Office Audits

Once a field project has been completed, the individual files will be either assembled, organized, and securely stored or returned to EPA. The QAM may schedule audits of project files.

The documents are examined to determine that all necessary items such as signatures, dates, and project codes are included.

The auditor examines any classified documents and determines if they are handled and stored in the proper manner.

In addition to the audits performed, the project manager will review product quality and will see that the project is performed in accordance with approved quality assurance procedures. Prior to the production of the draft document, all work products will undergo review by senior project staff and/or senior staff from the technical disciplines involved in the work. This will include review of calculation brief, test analyses, graphs, tables, computer inputs/outputs, and any document which involves generating information from the field data.

The Contract Laboratory Program is under the control of EPA and is subject to audits as determined by the EPA.

16.0 CORRECTIVE ACTION PROCEDURES

Corrective action procedures that might be implemented from audit results of detection of unacceptable data are developed on a case-by-case basis. Such actions may include altering procedures in the field, using a different batch of sample containers, or recommending an audit of laboratory procedures. The project manager is responsible for initiating the corrective action. The QAM is responsible for approving the corrective action.

17.0 QUALITY ASSURANCE REPORTS

For this project, no separte report is anticipated to describe the performance of the data measurement systems or the data quality. The Final Field Investigation report will contain separate Quality Assurance sections that summarize data quality information collected during the project. Sampling data will be summarized by Ecology and Environment, Inc., using forms for sample documentation and reporting. These data summaries, along with the raw data, will be attached to all reports.

18.0 SAMPLE PACKAGING AND SHIPMENT

1. Read and fully understand CLP manual.

2. Collect samples in appropriate containers.

3. Add correct preservatives as necessary.

4. Print clearly in ballpoint on the proper sample stickers the preservative that has been added to each aliquot.

5. Attach Traffic Report sample sticker to the correct aliquot after the sample has been collected and the container cleaned and dried off. Cover the sample stickers with one layer of strapping tape if it appears that adhesion to the sample container may be a problem.

6. Seal and package sample containers as shown in figures one through three.

7. Fill out Traffic Reports as indicated in figures four through six.

8. Separate samples according to analysis. Generally organics are shipped to one lab and inorganics to another.

9. Assign airbills to coolers and complete Traffic Reports and Chain of Custody (COC) forms using the correct airbill numbers. Figures seven through nine show how to fill out these forms. Use one COC form per cooler.

10. Place samples into coolers according to lab destination. Remember each cooler must weigh less than 70 lbs. including ice. Keep samples upright and well protected from shipping damage. Pack hazardous samples (already in paint cans) in vermiculite or its equivalent.

11. Ice samples if necessary. Be sure to seal ice in a plastic bag other than the one it was purchased in.

12. Seal the bottom two copies of each Traffic Report and the top copy of each COC form inside of a ziplock bag. Use strapping tape to hold the packet on the inside lid of the cooler.

13. Seal cooler with strapping tape. Several twelve inch strips are enough to do the job. Place a custody seal on each cooler and cover it with strapping tape to protect it.

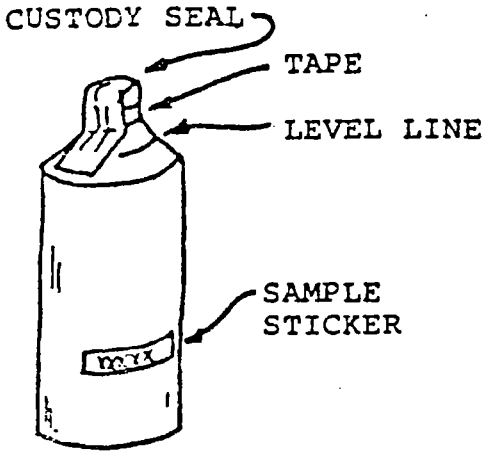
13A. Coolers must be labelled correctly. "Fragile" and "This-end-up" labels go on all four sides of each cooler. Additionally, "Flammable Liquid", "Flammable Liquid N.O.S. UN# 1993", and "Cargo Aircraft Only" labels must go on all four sides of coolers containing hazardous samples. These labels must be completely uncovered and clearly 100% visible.

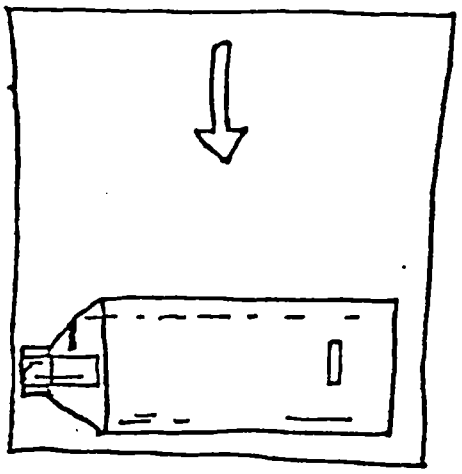
14. Ship samples. Be sure to keep coolers and airbills organized so that shipping destinations are correct.

15. Telephone CLP SMO (703-557-2490) with airbill numbers and sample data ASAP. Use COC forms to keep this information organized.

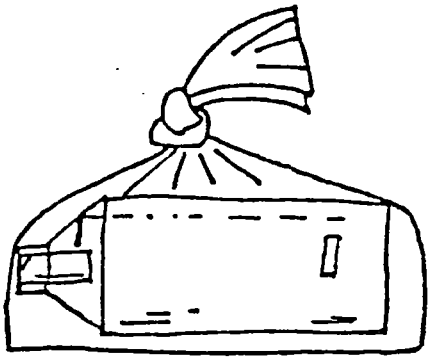
FIGURE ONE

Plastic Bottles...

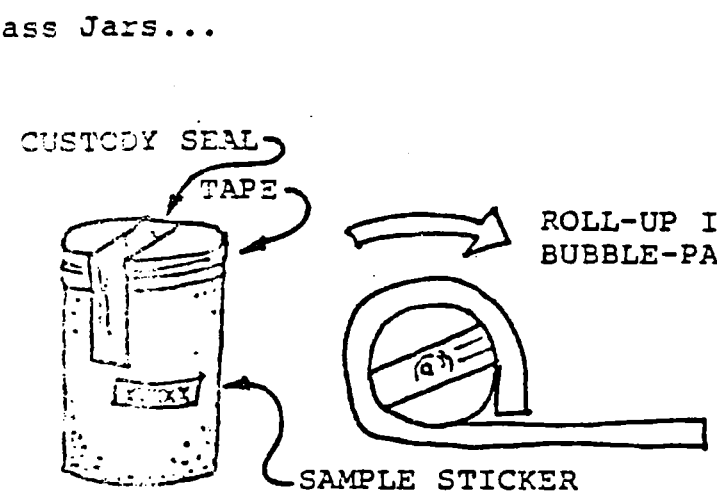


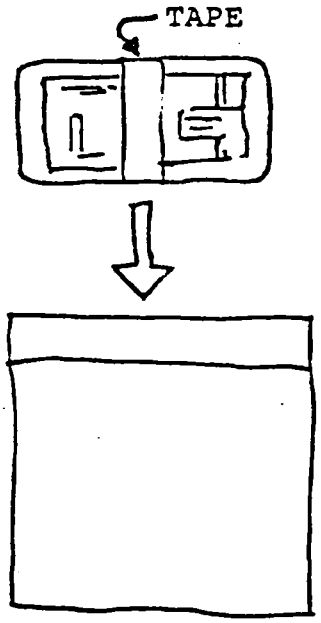


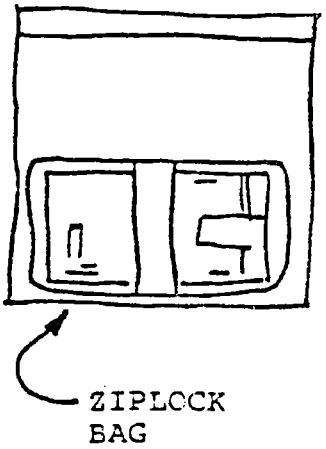
KNOTTED BAG



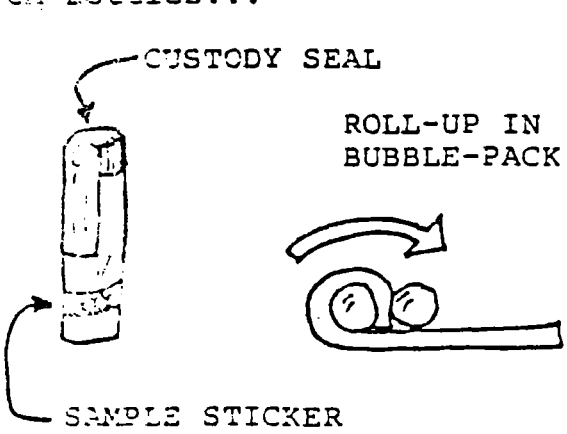
Glass Jars...

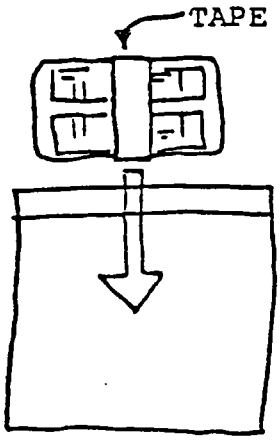






VOA Bottles...





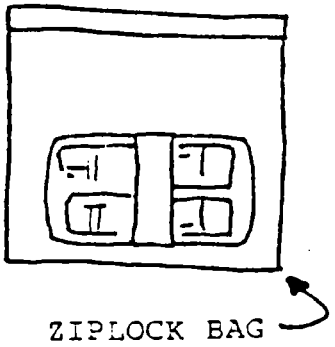
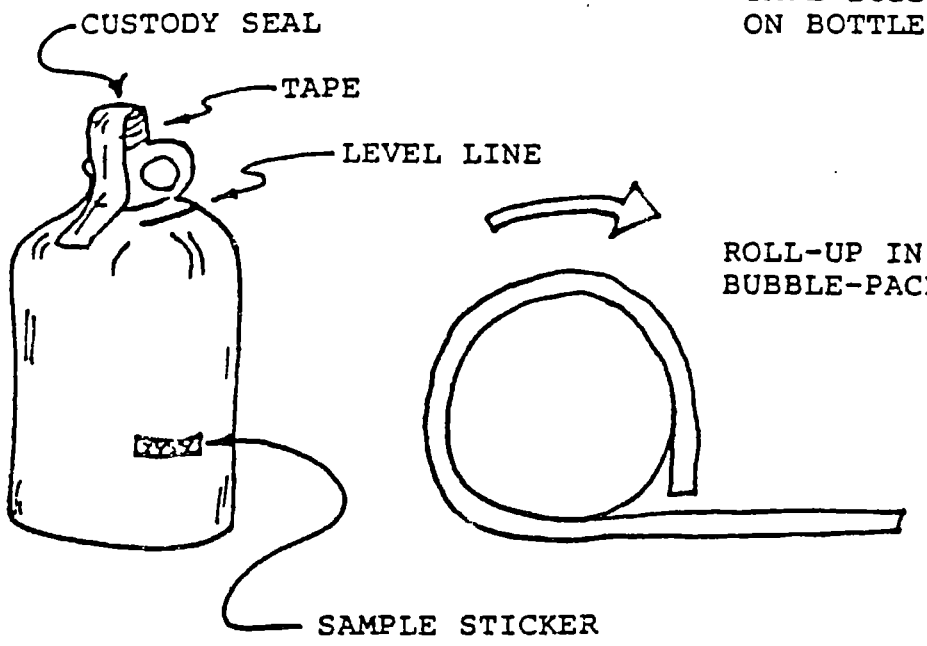
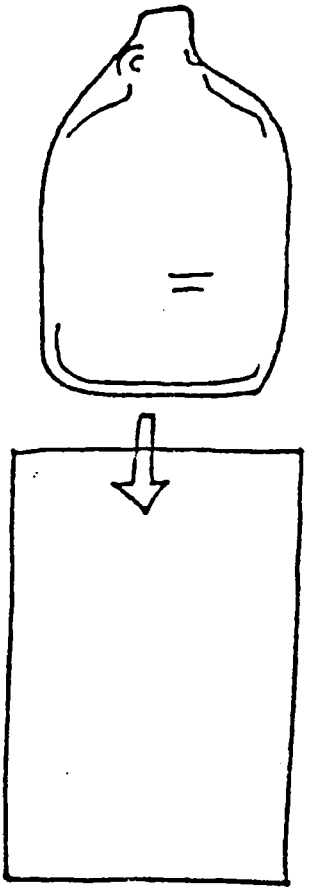


FIGURE TWO

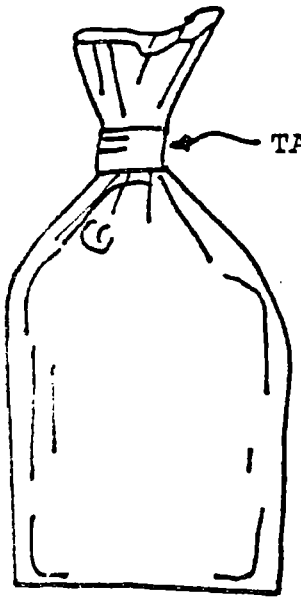
1-Liter Bottles...



TAPE BUBBLE-PACK
ON BOTTLE



MEDIUM PLASTIC BAG

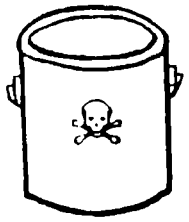


NOTE: THESE BOTTLES ARE VERY FRAGILE AND BREAK IF THEY ARE NOT PROTECTED WELL ENOUGH.

SAMPLE PACKAGING SUMMARY

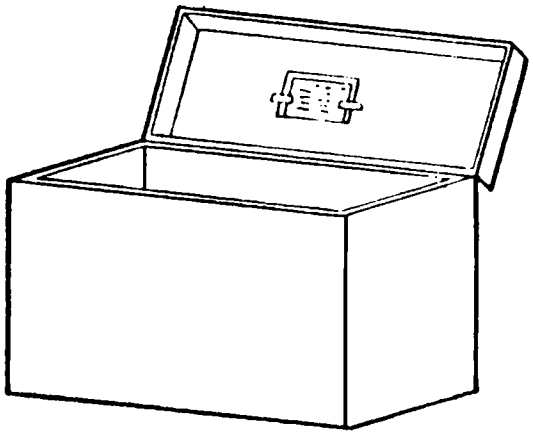
- ENCLOSE ALL SAMPLE CONTAINERS IN CLEAR PLASTIC BAGS

- COOL ORGANIC LOW WATERS TO 4°C (DO NOT ICE DIOXIN SAMPLES, INORGANIC LOW WATERS, OR MEDIUM/HIGH LEVEL WATERS OR SOILS; ICE IS OPTIONAL FOR LOW LEVEL SOILS)



- PACK ALL MEDIUM AND HIGH LEVEL WATER AND SOIL SAMPLES IN METAL PAINT CANS

- SURROUND CONTENTS OF CAN WITH NON-COMBUSTIBLE, ABSORBENT PACKING MATERIAL



- PACK SEALED PAINT CANS OR PLASTIC-ENCLOSED SAMPLE BOTTLES IN SHIPMENT CONTAINER

- USE A METAL ICE CHEST FOR SHIPMENT
  (DO NOT USE CARDBOARD OR STYROFOAM CONTAINERS TO SHIP SAMPLES)

- SURROUND CONTENTS WITH NON-COMBUSTIBLE, ABSORBENT PACKING MATERIAL
  (DO NOT USE EARTH OR ICE PACKING MATERIALS)

- TAPE PAPERWORK IN PLASTIC BAGS UNDER COOLER LID

- CLOSE COOLER AND SEAL WITH CUSTODY SEALS

FIGURE THREE

FIGURE FOUR

U.S. ENVIRONMENTAL PROTECTION AGENCY HWI Sample Management Office
PO Box 818, Alexandria, VA 22313 - 703/557-2490 - FTS/557-2490

INORGANICS TRAFFIC REPORT

Sample Number
MJ 9364

(1) **Case Number:** 392 J
Sample Site Name/Code:
Amer. Surplus Sales
11 Z 101
S-2

(2) **SAMPLE CONCENTRATION**
(Check One)
X Low Concentration
___ Medium Concentration

(3) **SAMPLE MATRIX**
(Check One)
X Water
___ Soil/Sediment

(4) **Ship To:**
Chemtech
360 W 11th St
NY NY 10014
Attn: Dr. Allen Schaffman

Transfer Ship To:

(5) **Sampling Office:** 10
Sampling Personnel: FIT
(Name) Lombardo/Tobin
(Phone) (201) 624-9537
Sampling Date: 3/22/83
(Begin) 1000 (End) ___

(6) **Shipping Information:**
Name Of Carrier:
Fed Express
Date Shipped: 3/22/83
Airbill Number: 019254 9200

SAMPLE

(7) **Sample Description:**
(Check One)
___ Surface Water
X Ground Water
___ Leachate
___ Mixed Media
___ Solids
___ Other ___ (specify)
MATCHES ORGANIC SAMPLE NO. 52132

(8) **Mark Volume Level On Sample Bottle**
Check Analysis required
___ ~~Task 1 & 2~~
X Task 3 Ammonia
~~Sulfide~~
Cyanide
___ ~~TOC~~
___ ~~Fluoride & pH~~

SHIP COPY

MJ 9364 - Task 1 & 2
MJ 9364 - Task 1 & 2
MJ 9364 - Task 3
MJ 9364 - Task 3
MJ 9364 - Task 3
MJ 9364 - Task 3
MJ 9364 - Task 3

FIGURE FIVE

U.S. ENVIRONMENTAL PROTECTION AGENCY
CLP Sample Management Office
P.O. Box 818 - Alexandria, Virginia 22313
Phone: 703/557-2490 - FTS/557-2490

SAS Number

SPECIAL ANALYTICAL SERVICE

PACKING LIST

Sampling Office:	Sampling Date(s):	Ship To:	For Lab Use Only
Sampling Contact: (name)	Date Shipped:		Date Samples Rec'd:
(phone)	Site Name/Code:	Attn:	Received By:

	Sample Numbers	Sample Description i.e., Analysis, Matrix, Concentration	Sample Condition on Receipt at Lab
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

For Lab Use Only

White - SMO Copy, Yellow - Region Copy, Pink - Lab Copy for return to SMO, Gold - Lab Copy

FIGURE SIX

U.S. ENVIRONMENTAL PROTECTION AGENCY/HWT Sample Management Office
P.O. Box 818/Alexandria, Virginia 22313/703/557-2490/FTS/557-2490

ORGANICS TRAFFIC REPORT

Sample Number: J 2132

① Case Number: 3925

Sample Site Name/Code:
Ames Jerseys
117101
3-2

② SAMPLE CONCENTRATION (Check One)
✓ Low Concentration
___ Medium Concentration

③ SAMPLE MATRIX (Check One)
✓ Water
___ Soil/Sediment

④ Ship To:
Mead Conpuchem

Attn: Angie Frye

Transfer Ship To:

⑤ Regional Office: X
Sampling Personnel: FIT
Lou Ardo/Tobin
(Name)
(201) 624-9537
(Phone)
Sampling Date: 3/22/83
(Begin) (End)

⑥ For each sample collected specify number of containers used and mark volume level on each bottle.

	Number of Containers	Approx. Total Vol.
Water (Extractable)	2	1 gal
Water (VOA)	2	80 ml
Soil/Sediment		
Water (Ext/VOA)		
Other		

SAMPLE

⑦ Shipping Information
Fed Express
Name of Carrier
3/22/83
Date Shipped:
181466890
Airbill Number:

⑧ Sample Description
___ Surface Water ___ Mixed Media
X Ground Water ___ Solids
___ Leachate ___ Other (specify) _____

⑨ Samp

J 2132	- Water (Extractable)
J 2132	- Water (Extractable)
J 2132	- Water (Extractable)
J 2132	- Water (Extractable)
J 2132	- Water (VOA)
J 2132	- Water (VOA)
J 2132	- Soil/Sediment (Ext & VOA)
J 2132	- Soil/Sediment (Ext & VOA)
J 2132	- Water (Ext & VOA)
J 2132	- Water (Ext & VOA)

⑩ Special Handling Instructions:
(e.g., safety precautions, hazardous nature)

SMO COPY

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DATE

FROM (Your Name)

COMPANY DEPARTMENT/FLOOR NO.

STREET ADDRESS

CITY STATE

1

TO (Recipient's Name)

If Hold For Pick-Up or Saturday Delivery, Recipient's Phone Number

COMPANY DEPARTMENT/FLOOR NO.

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE)

CITY STATE

2

AIRBILL NO. 463973974

ZIP ACCURATE ZIP CODE REQUIRED FOR CORRECT INVOICING

IN TENDERING THIS SHIPMENT, SHIPPER AGREES THAT F.E.C. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM CARRIAGE HEREOF. F.E.C. DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THIS SHIPMENT. THIS IS A NON-NEGOTIABLE AIRBILL SUBJECT TO CONDITIONS OF CONTRACT SET FORTH ON REVERSE OF SHIPPER'S COPY. UNLESS YOU DECLARE A HIGHER VALUE, THE LIABILITY OF FEDERAL EXPRESS CORPORATION IS LIMITED TO $100.00. FEDERAL EXPRESS DOES NOT CARRY CARGO LIABILITY INSURANCE.

ZIP ACCURATE ZIP CODE REQUIRED FOR OVERNIGHT DELIVERY

YOUR NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE)

3

PAYMENT ☐ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☐ Bill Credit Card

☐ Cash In Advance Account Number/Credit Card Number

SERVICES CHECK ONLY ONE BOX	DELIVERY AND SPECIAL HANDLING CHECK SERVICES REQUIRED
PRIORITY 1 — OVERNIGHT LETTER	1 ☐ HOLD FOR PICK-UP AT FOLLOWING FEDERAL EXPRESS LOCATION SHOWN IN SERVICE GUIDE. RECIPIENT'S PHONE NUMBER IS REQUIRED
1 ☐ OVERNIGHT PACKAGES (up to 70 LBS.)	2 ☐ DELIVER
COURIER PAK	3 ☐ SATURDAY SERVICE REQUIRED (See Reverse (extra charge applies for delivery.)
2 ☐ OVERNIGHT ENVELOPE (up to 2 LBS.)	4 ☐ RESTRICTED ARTICLES SERVICE (P.1 and Standard Air Packages only, extra charge)
3 ☐ OVERNIGHT BOX (up to 5 LBS.)	5 ☐ SSS (Signature Security Service required, extra charge applies)
4 ☐ OVERNIGHT TUBE (up to 5 LBS.)	6 ☐ DRY ICE _____ LBS
STANDARD AIR	7 ☐ OTHER SPECIAL SERVICE _____
5 ☐ DELIVERY 2ND BUSINESS DAY FOLLOWING PICK UP (up to 70 LBS.)	8 ☐ _____
OVERNIGHT IS NEXT BUSINESS DAY (MONDAY THROUGH FRIDAY). TWO DAYS FROM ALASKA/HAWAII. SATURDAY DELIVERY AVAILABLE IN CONTINENTAL U.S. SEE SPECIAL HANDLING	9 ☐

4

PACKAGES	WEIGHT	DECLARED VALUE	O/S
TOTAL	TOTAL	TOTAL	

5

RECEIVED AT
SHIPPER'S DOOR
☐ REGULAR STOP
☐ ON-CALL STOP
☐ F.E.C. LOC.

Federal Express Corporation Employee No.

DATE/TIME For Federal Express Use

FEDERAL EXPRESS USE	
FREIGHT CHARGES	
DECLARED VALUE CHARGE	
AGT/PRO	ADVANCE ORIGIN
AGT/PRO	ADVANCE DESTINATION
	OTHER
	TOTAL CHARGES

PART #204173075O
FEC S 0750 D-O W
REVISION DATE 2-83 %
PRINTED U S A

Z06

ORIGIN ACCOUNTING COPY

FIGURE SEVEN

A-41

FEDERAL EXPRESS

PLEASE COMPLETE ALL INF
SEE BACK OF FORM SET FC

FIGURE EIGHT

GE

E 0 6 3 6 7 0 7 1

YOUR FEDERAL EXPRESS ACCOUNT
0941-5298-0

FROM (Your Name)
(fill out the top half of this form just

TO (Recipient's Name)
like a regular airbill)

If Held For Pick Up or Saturday Deliver
Recipient's Phone Number

COMPANY
ECOLOGY & ENVIRONMENT

DEPARTMENT/FLOOR NO.

COMPANY

DEPARTMENT/FLOOR NO.

STREET ADDRESS
120 HOWARD ST STE 440

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE)

CITY
SAN FRANCISCO

STATE
CA

CITY

STATE

AIRBILL NO. 286367071

ZIP
9 4 1 0 5

IN TENDERING THIS SHIPMENT, SHIPPER AGREES THAT F.E.C. SHALL NOT BE LIABLE FOR SPECIAL INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM CARRIAGE HEREOF. F.E.C. DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THIS SHIPMENT. THIS IS A NON NEGOTIABLE AIRBILL SUBJECT TO CONDITIONS OF CONTRACT SET FORTH ON REVERSE OF SHIPPER'S COPY. UNLESS YOU DECLARE A HIGHER VALUE, THE LIABILITY OF FEDERAL EXPRESS CORPORATION IS LIMITED TO $100.00. FEDERAL EXPRESS DOES NOT CARRY CARGO LIABILITY INSURANCE.

ZIP

YOUR NOTES/REFERENCE NUMBERS (FIRST 12 CHARACTERS WILL ALSO APPEAR ON INVOICE)

FEDERAL EXPRESS USE

FREIGHT CHARGES

DECLARED VALUE CHARG

PAYMENT ☐ Bill Shipper ☐ Bill Recipient's F.E.C. Acct. ☐ Bill 3rd Party F.E.C. Acct. ☐ Bill Credit Card
☐ Cash in Advance Account Number/Credit Card Number

SERVICES CHECK ONLY ONE BOX	DELIVERY AND SPECIAL HANDLING CHECK SERVICES REQUIRED	PACKAGES	WEIGHT	DECLARED VALUE	O/S
PRIORITY 1 ☒ Next Flight Out (Not to P.O. Box)	1 ☐ HOLD FOR PICK-UP AT FOLLOWING FEDERAL EXPRESS LOCATION SHOWN IN SERVICE GUIDE. RECIPIENT'S PHONE NUMBER IS REQUIRED.				
	2 ☐ Saver				
	3 ☐ Saturday Service Required (Not Available for Standard Air or Overnight)				
	4 ☐ Restricted Articles Service (P-1 and Standard Air Packages Only)				
	5 ☐ Dry Ice				
	6 ☐ Dry Ice ____ LBS.				
	7 ☐ Other Special Service				
	8 ☐				
	9 ☐	TOTAL	TOTAL	TOTAL	

STANDARD AIR ☐ Standard Air Service (Not to P.O. Box) — ORM'S AND RADIOACTIVE MATERIAL ONLY

OVERNIGHT IS NEXT BUSINESS DAY (MONDAY THROUGH FRIDAY). TWO DAYS FROM ALASKA AND HAWAII. SATURDAY DELIVERY AVAILABLE IN CERTAIN U.S. SPECIAL HANDLING.

RECEIVED AT
SHIPPER'S DOOR
☐ REGULAR STOP
☐ ON-CALL STOP
☐ F.E.C. LOC

Federal Express Corporation Employee No.

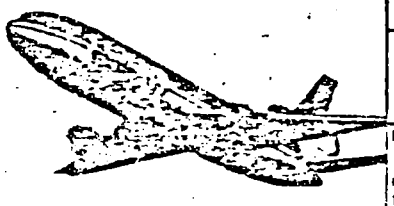
DATE/TIME For Federal Express Use

AGT/PRO — ADVANCE ORIGIN

AGT/PRO — ADVANCE DESTINATION

OTHER

TOTAL CHARGES



PART #2041730764
REVISION DATE 10/82
PRINTED U.S.A.

Restricted articles must go P-1.

AIRBILL NUMBER
286367071

SHIPPER'S CERTIFICATION FOR RESTRICTED ARTICLES

(TYPE OR PRINT)

NO. OF PKGS	PROPER SHIPPING NAME (PER 49 CFR 172.101)	CLASSIFICATION	IDENTIFICATION NO.	NET QUANTITY PER PACKAGE
1	FLAMMABLE LIQUID N.O.S.		U.N. #1993	< 10 GAL
	LIMITED QUANTITY			
	CARGO AIRCRAFT ONLY			

ADDITIONAL DESCRIPTION REQUIREMENTS FOR RADIOACTIVE MATERIALS (SEE BACK)

RADIONUCLIDE	FORM	ACTIVITY	CATEGORY OF LABELS	TRANS INDEX	PACKAGE IDENTIFICATION

THIS SHIPMENT IS WITHIN THE LIMITATIONS PRESCRIBED FOR PASSENGER AIRCRAFT / CARGO AIRCRAFT ONLY (DELETE-NONAPPLICABLE)

IF ACCEPTABLE FOR PASSENGER AIRCRAFT, THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN, OR INCIDENT TO, RESEARCH, MEDICAL DIAGNOSIS OR TREATMENT.

I HEREBY CERTIFY THAT THE CONTENTS OF THIS CONSIGNMENT ARE FULLY AND ACCURATELY DESCRIBED ABOVE BY PROPER SHIPPING NAME AND ARE CLASSIFIED, PACKED, MARKED, AND LABELED, AND IN PROPER CONDITION FOR CARRIAGE BY AIR ACCORDING TO APPLICABLE NATIONAL GOVERNMENTAL REGULATIONS.

NAME AND TITLE OF PERSON SIGNING CERTIFICATION	EMERGENCY TELEPHONE NO.	SIGNATURE OF SHIPPER

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
	LANDFILL

SAMPLERS: *(Signature)*

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA	TASK 1&2					REMARKS
Z699	1/1/	82		X	WELL#1	2	X						Y1000
Z700	1/1/	82	X		WELL#2	3	X	X					Y1001 MY1001

(information in this area is optional)

(Traffic Report numbers are helpfull when recorded here)

(time information is generally left out unless it would be helpfull)

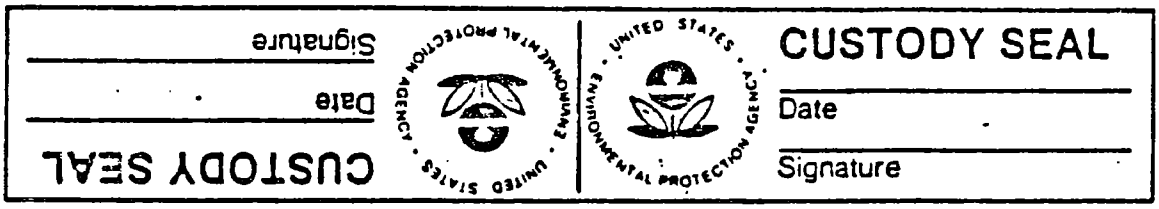
FIGURE NINE

A-43

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
!@#$%¢&*'(-) ½½ - -	1/1/82 1200	FED EX AIRBILL # 123456789			
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*

Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks
				(as required)

FIGURE TEN


CUSTODY SEAL
Date
Signature
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
CUSTODY SEAL
Date
Signature
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY


U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION V
OFFICIAL SEAL
№ 10289

APPENDIX B

SITE SAFETY CONSIDERATIONS

The site safety plan will be submitted pending approval of the proposed workplan by the USEPA

$$\begin{array}{r} 95 \\ 72 \\ \hline 23 \end{array} \quad (15) - 3$$

$$\begin{array}{r} 8\,13 \\ 58 \\ \hline 25 \end{array} \quad (16)$$

$$\begin{array}{r} 99 \\ 68 \\ \hline 31 \end{array}$$